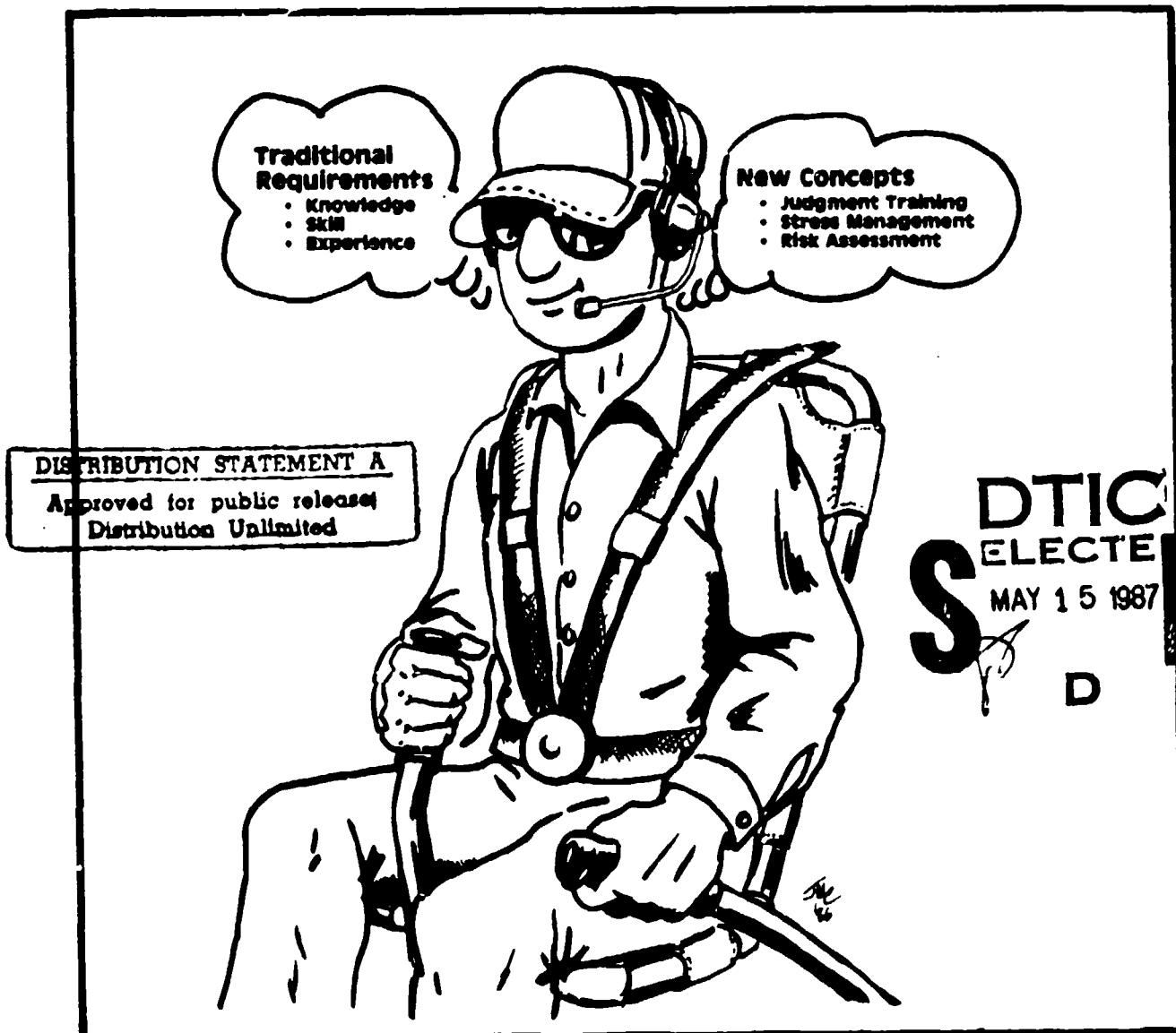


**BIG FILE WPT**  
**Aeronautical Decision**  
**Making for**  
**Helicopter Pilots**

DOT/FAA/PM-86/45

Program Engineering  
and Maintenance Service  
Washington, D.C. 20591

(2)

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of Transportation  
Federal Aviation  
AdministrationSystems Control Technology, Inc.  
1611 North Kent Street, Suite 905  
Arlington, Virginia 22209**DISTRIBUTION STATEMENT A**  
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Distribution UnlimitedFebruary 1987  
Training ManualThis document is available to the public  
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Systems Control Technology  
Transport Canada

## Technical Report Documentation Page

1. Report No. DOT/FAA/PM-86/45	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle  Aeronautical Decision Making for Helicopter Pilots		5. Report Date February 1987	
7. Author(s) R. J. Adams, J. L. Thompson		6. Performing Organization Code	
9. Performing Organization Name and Address Systems Control Technology, Inc. 1611 North Kent Street, Suite 905 Arlington, VA 22209		8. Performing Organization Report No.	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration 800 Independence Avenue, S.W. Washington, D.C. 20591		10. Work Unit No. (TRAIS)	
15. Supplementary Notes AAM-500 Biomedical and Behavioral Sciences Division APM-450 Navigation and Landing Division, Helicopter Program Branch		11. Contract or Grant No. DTFA01-80-C-10080	
16. Abstract  Aviation accident data indicate that the majority of aircraft mishaps are due to judgment errors. This training manual is part of a project to develop materials and techniques to help improve pilot decision making. Training programs using prototype versions of these materials have demonstrated substantial reductions in pilot error rates. The results of such tests were statistically significant and ranged from approximately 10% to 50% fewer mistakes.		13. Type of Report and Period Covered	
 This manual is designed to explain the risks associated with helicopter flying activities, the underlying behavioral causes of typical accidents, and the effects of stress on pilot decision making. It provides a means for the individual pilot to develop an "Attitude Profile" through a self-assessment inventory and provides detailed explanations of pre-flight and in-flight stress management techniques. The assumption is that pilots receiving this training will develop a positive attitude toward safety and the ability to effectively manage stress while recognizing and avoiding unnecessary risk. The examples used are taken from real accident and incident reports.			
 This manual is one of a series on Aeronautical Decision Making prepared for the following pilot audiences: (1) Student and Private (2) Commercial (3) Instrument (4) Instructor (5) Helicopter (6) Multi-Crew. <b>Keywords:</b>			
17. Key Words Human Factors, Human Performance, Aviation Safety, Aviation Training, Pilot Error,	Judgment, Decision-Making, Helicopter Pilot, Helicopters, Rotorcraft.	18. Distribution Statement This document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 133	22. Price

#### PREFACE

This helicopter pilot decision making manual was prepared by Systems Control Technology, Inc. as one task in support of the Federal Aviation Administration's Helicopter Technical Support Contract (DTFA01-80-C-10080). The material presented is based upon an extensive, multiyear analysis of helicopter accidents also performed under this contract. Report number DOT/FAA/PM-85/25 "Investigation of Hazards of Helicopter Operations and Root Causes of Helicopter Accidents" provides detailed background data and pilot error accident root cause analyses.

In addition to the accident analyses, the prepared material is based upon extensive aviation research by several individuals. We would like to thank the following individuals who assisted us in preparing this document. Recognition is given to Dr. Alan Z. Diehl of the FAA Office of Aviation Medicine, Dr. Georgette Buch of Transport Canada, Mr. Peter V. Hwoschinsky of the FAA Navigation and Landing Division, Helicopter Program Branch, Dr. Richard S. Jensen from the Ohio State University Aviation Psychology Department and Mr. Russell S. Lawton from the Aircraft Owners and Pilots Association Air Safety Foundation. These five individuals developed the basic concepts and instituted the application of their knowledge to the improvement of helicopter safety.

We also wish to thank Mr. John Christy who did such a fine job of illustrating the judgment manual. And finally, our thanks to Ms. Michelle McDaniel who so patiently typed and retyped this manual until all the contributors agreed on its final form.

## FOREWORD

This is an Aeronautical Decision Making (ADM) manual for helicopter pilots. The materials presented are the results of ten years research, development, testing and evaluation of the feasibility and effectiveness of teaching the decision making process (how to make good judgment decisions). This material was jointly developed to improve aviation safety by Systems Control Technology, Inc., with support and collaboration with the Federal Aviation Administration (Department of Transportation), the Helicopter Association International, the Aircraft Owners and Pilots Association Air Safety Foundation, General Aviation Manufacturers Association, The Flight Safety Foundation, Aviation Research Associates, Transport Canada, Director General of Civil Aviation (France) and Department of Aviation (Australia).

Although these materials have never been specifically tested for their effectiveness on reducing helicopter pilot decision making errors, they are based heavily on materials developed for fixed wing general aviation which have been extensively tested by the FAA, Transport Canada, and the USAF in six independent studies. The results of those studies indicated that pilots receiving the prototype decision making materials outperformed their contemporaries during inflight tests. The differences were statistically significant and ranged from approximately 10 to 50 percent fewer decision making errors.

## ACKNOWLEDGEMENTS

This training manual is the result of extensive revisions to the FAA three volume report "Pilot Judgment Training and Evaluation", (DOT/FAA/CT-82/56) and "Judgment Evaluation and Instruction in Civil Pilot Training" (FAA-RD-78-24).

Many individuals participated in the development and refinement of these materials:

Robert A. Alkov	U.S. Naval Safety Center
Ronald J. Lofaro	Army Research Institute
Catherine H. Nickolaisen	New Jersey State Aviation Director
Robert D. Smith	FAA Helicopter Program
Richard A. Weiss	FAA Cockpit Technology Program

Their contributions are gratefully acknowledged.

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AERONAUTICAL DECISION MAKING

FOR HELICOPTER PILOTS

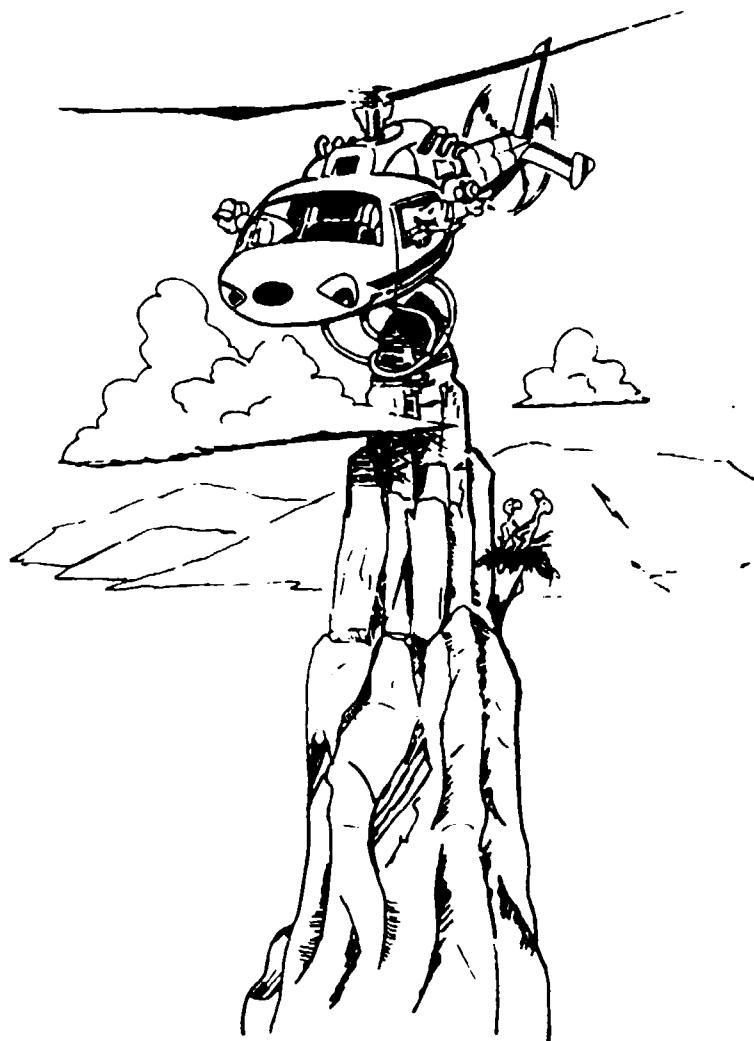


Learning how to make good judgment decisions under stress.

Please note -- This material is designed to be learned under the direct supervision of a flight instructor. These concepts can benefit both experienced and student pilots.

## 1.0 INTRODUCTION TO DECISION MAKING

Decision making refers to the mental process we all use in determining a particular course of action. When used by pilots in conjunction with their flying activities, this process is known as Aeronautical Decision Making (ADM). Most pilots believe that good judgment is a natural by-product of experience but, at the same time, they also are generally convinced that if you don't have enough of the former, you will never live long enough to gain the latter. This classic "Chicken-or-Egg" syndrome can be overcome with the realization that good decision making skills are a part of a systematic mental process that can be learned by any pilot - from the neophyte to the veteran.



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.....Making good pilot decisions is a process which involves timely assessment of all relevant situational factors (Personal, Aircraft, Environment and Operation), a decision to act (or not) and a response.

## A. Judgment Principles

### 1. Definition of Judgment

A popular belief is that judgment is good common "sense" as applied to the making of decisions, especially correct decisions. "Sense" relates to an intense awareness, realization, and understanding of all the factors involved in making a decision. Sense is generally applied to a person's ability to act effectively and positively in any given situation.

Judgment is not an end in itself. In making a decision, pilots should consider all relevant intrapersonal, aircraft, operational (the mission or the purpose of the flight) and environmental factors which may influence the decision making process. Pilot judgment is, therefore, a process which produces a thoughtful, considered decision relating to the aircraft's operation along with an inseparable response (i.e., action/inaction) to that decision.

This viewpoint that good decision making is a process which involves thoughtful consideration and an outcome uncovers the elements of a useful definition. They are:

- The ability to search for and establish the relevance of all available information about oneself, the aircraft, the environment, the operation, the flight situation; to specify alternative courses of action; and, to determine expected outcomes from each alternative.
- The motivation to choose and authoritatively execute a course of action which assures safety within the time frame permitted by the situation.

Taking this viewpoint, that good pilot judgment is a process which involves thoughtful consideration and an outcome, a step farther a definition emerges:

"Pilot judgment is the process of recognizing and analyzing all available information about oneself, the aircraft, the flying environment and the purpose of the flight. This is followed by the rational evaluation of alternatives to implement a timely decision for the situation which assures safety. Pilot judgment thus involves one's attitudes toward risk-taking and one's ability to evaluate risks and make decisions based upon one's knowledge, skills, and experience. A judgmental decision always involves a problem or choice, an unknown element, and usually a time constraint and stress."

It should be noted that the terms: "judgment", "decision making", "pilot decision making" and "aeronautical decision making" are largely synonymous. This series of manuals will use these terms interchangeably.

### 2. Pilot Responsibility

When the government certifies a pilot, it is granting that pilot the privilege to use public airspace and air navigation facilities. In

accepting this privilege, the pilot is expected to adhere to the rules and refrain from any activities which might infringe on the rights and safety of others. The regulations require the pilot-in-command to be the final authority for the safe operation of an aircraft. The pilot is ultimately responsible, but is influenced by many events and conditions, some of which have nothing to do with the actual control of the aircraft, e.g., personal problems, controllers, owners and managers, weather, etc.

When certificated, a pilot is expected to use "good judgment" to understand and interpret the rules in individual situations and in the most responsible manner. However, accident statistics seem to indicate that pilots unfortunately fail to live up to that expectation: Nearly 85 percent of all general aviation accidents may be attributed in part or in whole to "pilot error." To determine why pilots make these errors, it is useful to classify pilot activities into three categories:

- Procedural Activities - Management of the powerplant, fuel, aircraft configuration, autopilot, displays, navigation and communication.
- Perceptual-Motor Activities - Aircraft control, judgment of distance, speed, altitude, hazard detection and geographic orientation.
- Decisional Activities - Include the self-assessment of skill, knowledge, physical and psychological capabilities, hazard assessment, navigation planning and flight priority adjustment.

An analysis of general aviation accident data classified fatal and non-fatal accidents attributed to "pilot error" during a five-year period into the three pilot activity categories mentioned above. The number and percentage of accidents for the five-year period classified into each category are listed below.

<u>Pilot Activity Category</u>	<u>Number/Percentage of FATAL Accidents</u>	<u>Number/Percentage of NON-FATAL Accidents</u>
Procedural	264 ( 4.6%)	2,230 ( 8.6%)
Perceptual-motor	2,496 (43.8%)	14,561 (56.3%)
Decisional	2,940 (51.6%)	9,081 (35.1%)

The majority of fatal pilot-induced accidents (51.6%) are the result of decisional behavior, also known as cognitive judgment. Good cognitive judgment involves rational decision making when choosing a course of action from several alternatives.

How a pilot handles responsibilities as "pilot-in-command" also depends to a large degree upon attitudes - toward safety, toward oneself, and toward flying. Attitudes are learned and good attitudes can be developed, through training, into a positive mental framework that encourages and produces good pilot decisionmaking. On the other hand, bad pilot habits created by previously learned attitudes can be

"unlearned" and modified, through training, into good attitudes.

Since decision making is a mental process, helicopter pilots can learn (or relearn, if necessary) to make good decisions under varying conditions of workload, stress and risk. They can learn to make good decisions to begin with and to recognize and stop the influence of one or more bad decisions. Adept decision making involves: recognition of change; assessment of alternative actions; a decision to act; a balancing of risks; and, continual monitoring of the response to your actions.

A basic skill in the ADM process is the ability to recognize the classic psychological pitfalls that all pilots encounter from time to time so that they can be eliminated out-of-hand as possible alternative actions.

#### B. CLASSIC PILOTING PSYCHOLOGICAL PITFALLS

Pilots, particularly those with considerable experience, as a rule try to complete a flight as planned, please passengers, meet schedules and generally demonstrate the "right stuff". This basic drive can have an adverse affect on safety and impose an unrealistic assessment of piloting skills under stressful situations. Even worse, these repetitive patterns of behavior, based on unrealistic assessments, produce piloting practices that are dangerous, often illegal and will ultimately lead to mishaps.

These dangerous tendencies or behavior patterns, which must be identified and eliminated, include:

Responding to Peer Pressure - Poor decision making based upon emotional response to peers rather than evaluating a situation objectively.

Mental Set (or expectancy) - The inability to recognize and cope with changes in the situation different from those anticipated or planned. Visual illusions and similar aural sounds occurring at the "wrong" time often lead to such miscues.

Get-There-Itis - This "disease", common among pilots, clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative courses of action.

Duck-Under Syndrome - The tendency to "sneak a peek" by descending below minimums during an approach. Based on a belief that there is always a built in "fudge" factor that can be used or on an unwillingness to admit defeat and shoot a missed approach.

Scud Running - Pushing the capabilities of the pilot and the aircraft to the limits by trying to maintain visual contact with the terrain while trying to avoid physical contact with it. This attitude is characterized by the old pilot's joke: "If it's too bad to go IFR, we'll go VFR."

Continuing VFR into Instrument Conditions - The all-too-often result of the above mentioned practice of scud running when this becomes the only alternative to flying into the ground. Even more dangerous if the pilot is not instrument qualified or is unwilling to believe what the gauges are indicating.

Getting Behind the Aircraft - Allowing events or the situation to control your actions rather than the other way around. Characterized by a constant state of surprise at what happens next.

Loss of Positional/Situational Awareness - Another case of getting behind the aircraft (mentioned above) which results in not knowing where you are, an inability to recognize deteriorating circumstances and/or the misjudgment of the rate of deterioration.

Operating without Adequate Fuel Reserves - Ignoring minimum fuel reserve requirements either VFR or IFR. Generally the result of overconfidence, lack of flight planning or deliberately ignoring the regulations.

Descent Below the Minimum Enroute Altitude - The duck-under syndrome (mentioned above) manifesting itself during the enroute portion of an IFR flight.

Flying Outside the Envelope - Unjustified reliance on the (usually mistaken) belief that the aircraft's high performance capabilities meet the demands imposed by the pilot's (usually overestimated) high performance flying skills.

Neglect of Flight Planning, Preflight Inspections, Checklists, Etc. - Unjustified reliance on the pilot's (usually overestimated) short and long term memory, regular flying skills, repetitive and familiar routes, etc.

All experienced pilots have fallen prey to, or have been tempted by, one or more of the above tendencies at times in their flying careers. Fortunately, they are natural mistakes that can be easily recognized for what they are and thus avoided.

### C. DECISION MAKING CONCEPTS

Many factors influence a pilot's decision making process. Knowledge, reasoning ability and skills are all important, as is the individual's emotional make-up, i.e: his or her personality and attitudes. Personality traits are deeply ingrained behavioral characteristics that are often well established in childhood. These personality traits are highly resistant to change and are beyond the scope of judgment training as developed in this manual.

#### 1. Attitudes

On the other hand, attitudes are motivational dispositions that are less deeply ingrained and can be changed or modified through training.

Each of us has attitudes about politics, religion, people, places, products and almost everything else. We use these attitudes as a sort of "mental shortcut" to arrive at a conclusion or make a decision without the necessity of going through a complete analysis of the subject each time. For example, by opting for membership in a political party, a particular church, or the "Yuppie Generation", we are also choosing a relatively quick, easy, and almost predetermined response to a given issue or question. Thus, we can more efficiently cope and function within our environment. We are constantly bombarded with attempts to change our attitudes by teachers, politicians, theologians, supervisors, parents, peers and all forms of advertising.

In aviation we develop most attitudes about flying through experience. We listen to and observe instructors and other pilots and thereby develop attitudes about taking risks, about assessing our own skills and knowledge and about making decisions. We also learn much how "real pilots" are supposed to behave through informal means: hangar flying, movies, television, novels, etc. A primary objective of this manual is to establish and reinforce safe attitudes toward flying.

This manual explains that certain attitudes are hazardous and are often associated with aviation accidents when they are present in the extreme. Five specific types of hazardous attitudes have been identified. A questionnaire is provided which enables the pilot to complete an attitude inventory. This inventory enables pilots to recognize their own propensity for these hazardous attitudes. Material is also provided to help pilots recognize these attitudes when they occur and to counter their effects.

## 2. Headwork

Another factor involved is the conscious, rational thought process used in making decisions, termed: "headwork". Good headwork involves risk identification and assessment, qualitative and quantitative information processing, and problem solving abilities. Headwork, when properly applied, minimizes the influence of hazardous attitudes, personality traits and the adverse effects of stress.

If it were possible to separate this aspect of rational judgment from the attitudinal part (which it is not), we would solve all problems in much the same way as a computer. This is not to say that our decisions would be error free because uncertainty is always present. The most reasonable information must be utilized and performance is dependent upon the amount, type, and accuracy of information available as well as inherent, and learned capabilities to process this information in a timely manner. A second objective of this manual is to teach good headwork.

## 3. Skills and Procedures

A third factor related to decision making is ones "airmanship" or "stick and rudder" abilities. This refers to the procedural, psychomotor and perceptual skills that are used to control a helicopter and its systems. These vital skills are intensively learned during the conventional training process to a point where they become virtually automatic reactions (e.g. stall recovery in airplanes and autorotation

procedures in helicopters). These skills are highly specific to the type of aircraft and are taught in traditional flight training programs using a variety of materials. Therefore, such information will not be duplicated in this manual.

#### 4. Cockpit Resource Management

In aircraft requiring multiperson crews, an additional aspect of decision making becomes important. Cockpit Resource Management (CRM) refers to the effective utilization of all the personnel, as well as material, assets available to a flight crew. The unique feature of CRM is the strong emphasis on leadership style and interpersonal communication skills to facilitate crew coordination. Although many helicopters are manned by multiperson crews, CRM, as a distinct topic, is covered in another manual in this series.

#### 5. Risk Management

Accident statistics for helicopters indicate that approximately 64% of all accidents annually were related to "the pilot". Clearly, the pilot is recognized as the major risk element in the safety of flight equation. The next three highest causal factors are "terrain", "powerplant" and "the aircraft." These are followed by "other personnel" and "weather" in that order.

The types of risk discussed in this manual are those associated with the five basic elements of any flight. They are:

1. The Pilot (or crew)
2. The Aircraft
3. The Environment
4. The Operation (or mission)
5. The Situation

The pilot has the primary controlling capability and responsibility for assessing the relative levels of risk in each element of the flight and effectively managing them in order to produce a safe outcome.

#### 6. Stress Management

Stress is the term used to define the body's response to demands placed upon it by physical, physiological or psychological factors known as stressors. For example, stress could be imposed by an unexpected windshear encountered during an approach, recognizing low oil pressure during the engine run up, losing your wallet, or cutting your finger. There are numerous stressors to cope with during a typical helicopter flight. These stressors are in addition to typical "life stressors" such as financial commitments, job pressures, or family troubles. Learning to recognize and cope with stress in ourselves is critical to making good decisions. Identifying the kinds of stress you experience while flying, developing coping mechanisms and an overall stress management plan are recognized as important elements of safe flight.

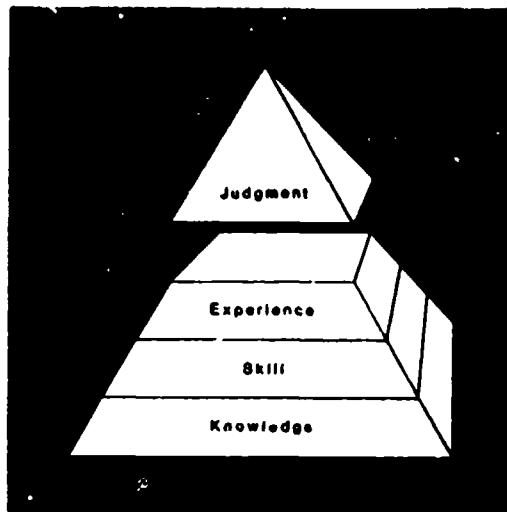
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.....Accidents Typically Are The Result of a Series of Pilot Decisions Involving a Chain of Errors.

## 2.0 JUDGMENT CONCEPTS

.....Have been especially designed to lead pilot's to think more carefully about flight activities and to guide them toward exercising better pilot decision making (judgments).

---



In aviation there are four basic risk elements:

- Pilot
- Aircraft
- Environment
- Operation

Accidents are the result of a chain of events, involving a variety of pilot-aircraft-environment-operation factors and occurring as a series of errors in the decision making situation.

### PILOT

Pilots are continually making judgments about their own competency, state of health, level of fatigue, and many other variables. Any time the problem focuses on the pilot, we include it under the subject area PILOT. Example:

The helicopter pilot had only four hours of sleep the night before because he was at a party. The boss then asked the pilot to fly him to a meeting in a city 750 miles away. The reported weather was marginal and not expected to improve. Using good judgment about his fatigued state, the pilot refused to make the flight. While his boss was initially unhappy, the pilot was later able to convince him of the unacceptable risks involved in such a trip.

---

## AIRCRAFT

Decisions are frequently based on judgments about the aircraft, such as its powerplant, equipment, fuel state, cargo or airworthiness. Any judgment about the helicopter and its handbook or its equipment is lumped into the risk element AIRCRAFT. Example:

During preflight, the pilot noticed the transmission oil filler cap did not seem to lock securely. The pilot decided to delay takeoff while a mechanic checked the situation. The pilot's good judgment was confirmed when the mechanic had to install a new cap. Although the aircraft risk element is really part of the pilot's environment, we separate it because it is a critical and frequent focus of decisions.

---

## ENVIRONMENT

Another important risk element is the ENVIRONMENT. Included here are factors such as weather, terrain, heliport, landing area, air traffic control, navaids, etc. As with pilot and aircraft risk elements, the environmental factor, especially weather, drastically changes over time. Example:

The pilot was landing a small, single engine helicopter on a parallel taxiway just after a wide-bodied, heavy jet had departed. The pilot assumed that wake turbulence would not be a problem since he had performed similar landings with the same separation. This time, the helicopter made a hard landing due to a combination of prevailing winds and the wing tip vortices from the heavy jet.

---

## OPERATION

The interaction of the pilot, aircraft, and environment are influenced by the purpose of each flight operation. The three other risk factors must be evaluated in the context of the desirability of undertaking or continuing the flight as planned - why is the flight being made, how critical is it to undertake the mission or maintain the planned schedule - must it be done now, is the trip worth the risks? Example:

The pilot continued the routine ferry flight from the factory despite marginal weather conditions. He calculated the groundspeed and determined that he would arrive at his destination with only 10 minutes fuel remaining. He felt it might be desirable to please the boss by keeping his schedule, by trying to "stretch" the fuel supply instead of landing to refuel. When the boss found out about the low fuel state, he and the pilot realized this could have easily resulted in an emergency landing.

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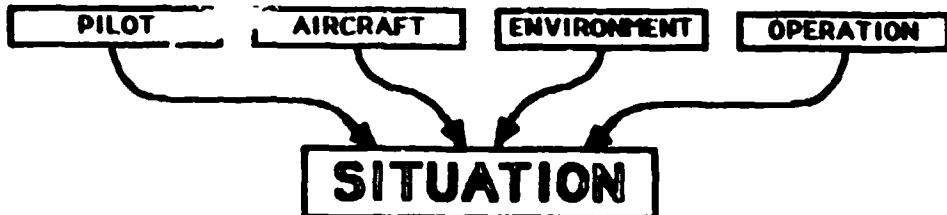


Figure 2.1

What differentiates "pilot error" from "good judgment"? What elements contribute to making correct decisions? For pilots, the major element is situational awareness.

Situational awareness is the accurate perception of the factors and conditions that affect the aircraft and the flightcrew during a specific period of time. More simply, it is knowing what is going on around you.

There is a direct relationship between situational awareness and safety. It's a fact---pilots who have higher levels of situational awareness are safer pilots.

The situation is a combination of, and is influenced by, pilot-aircraft-environment-operation risk elements. Examples:

a. Pilot/Environment - P/E

After nearly 8 hours of continuous flying in a cattle muster, the pilot was very tired (P). Some cows had wandered into a particularly dusty area. As he hovered near them he got too low and his downwash kicked up so much dust that he lost visual contact with the ground (E). Trying to back out of the dust cloud, his tailrotor struck an embankment.

b. Pilot/Aircraft/Environment--P/A/E

During a night cross country flight, ideal conditions for carburetor icing existed, and ice did develop (E). However, this model reciprocating engine picks up carb ice quickly. He concluded that the engine was losing power due to a mechanical failure, and did not turn on the carb-heat (P). Instead, the pilot closed the throttle and entered a hasty autorotation. Because of the deteriorated conditions of the aircraft's old windows (A) the pilot had difficulty judging altitude and made a hard landing (P).

c. Pilot/Aircraft/Environment/Operation -- P/A/E/O

Because a oil worker was critically ill, a helicopter was making an airborne radar approach (O) to an rig on a moonless night (E), the left engine chip detector light illuminated (A). The pilot and co-pilot became distracted and began a lengthy

discussion of the degree of seriousness (false alarm vs. actual engine damage) of the problem and the possible consequences of ignoring the indication (P). As a result, they overflew the rig (O), became disoriented (P) and had to execute a missed approach.

## CONVENTIONAL DECISION MAKING PROCESS

Conventional flight training prescribes the knowledge, experience, and skills necessary to conduct a flight within operational constraints. For the low-time pilot, the instructor attempts to teach good judgment, behavior, and performance through a set of limited, but supervised, flight situations. In doing so, the flight instructor not only teaches the necessary aviation knowledge and skills required to execute specific flight maneuvers, but also encourages the student to apply previously learned knowledge and skills to subsequent situations. Since the student cannot be taught how to handle every possible situation he or she may encounter, the instructor tries to provide a representative range of learning experiences so that the prospective pilot can later apply to similar situations. As the neophyte pilot displays competence in training situations, there is an increase in ability to perform safely. In new situations, the pilot's decision will be based upon two considerations: (1) What the pilot had previously learned which may be applicable to the new situation; and (2) what the pilot chooses to consider as relevant information for arriving at a new decision while operating in "unknown territory."

An accident is usually the result of an unfortunate combination of unlikely events with a harmful outcome. The previous examples have demonstrated that these events are interactions between the pilot, aircraft, environment and the nature of the mission or operation. Flying a helicopter requires a continuous stream of timely decisions. Recognition and understanding of these events allows a pilot to influence the outcome of the flight, thereby avoiding an accident. For example:

A helicopter pilot, with limited experience flying in adverse weather, wants to arrive at his destination by a certain time, and he is already 30 minutes late. In spite of his inexperience, he decides to fly through an area of possible thunderstorms in order to reach home base just before dark. Arriving in the thunderstorm area, he encounters lightning, turbulence, and heavy clouds. Night is approaching, and the thick cloud cover makes it very dark. In the darkness and turbulence, the pilot becomes spatially disoriented because he attempted to continue flying with visual reference to the ground instead of using his instruments to make the necessary 180 degree turn.

The pilot has made several errors in judgment: First, he let his desire to arrive at his destination on time override his concern for a safe flight. Then he overestimated his flying abilities and decided to use a route that took him through a potential area of thunderstorm activity. Next, the pilot pressed on into obviously deteriorating conditions instead of changing course or landing prior to his destination.

The disastrous results, however, need not have been a foregone conclusion. The pilot could have selected several alternate courses of action, but he did not. Good judgment would have meant flying around the adverse weather and accepting the fact that he might be late. Even once in the bad weather, good judgment could have led the pilot to decide to avoid flying near clouds and turbulence. And, finally, before becoming disoriented in the dark, the pilot could have used good judgment to calm himself and rely on his instruments.

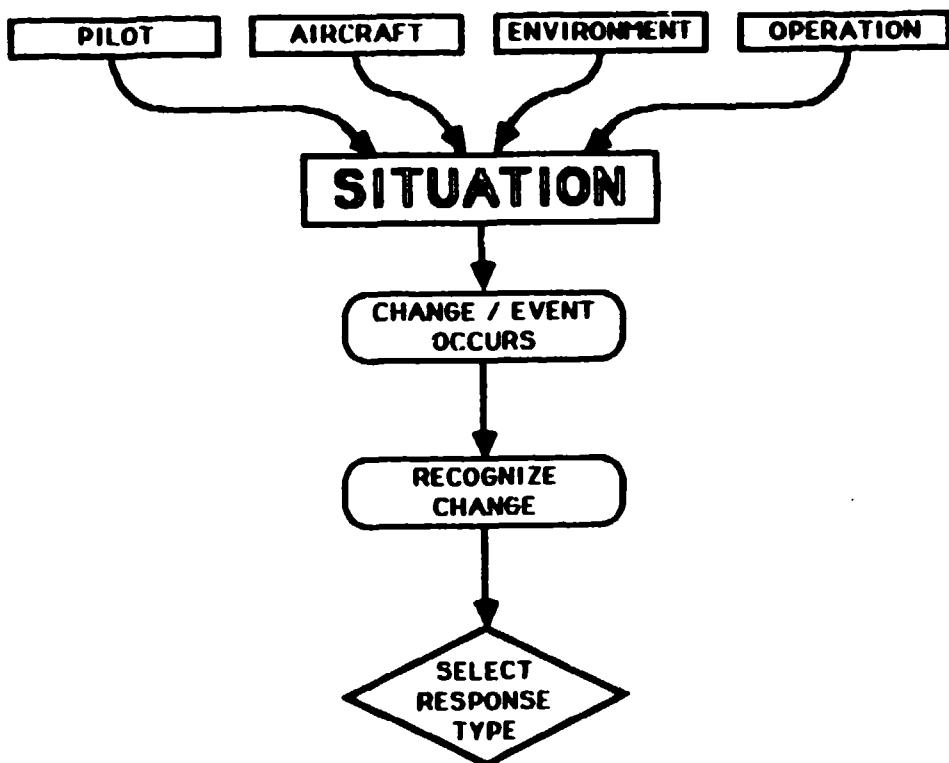


Figure 2.2

Normally, the need for a decision is triggered by recognition that something has changed, or an expected change did not occur in the four subject areas. The search for and recognition of change, e.g., groundspeed, weather, and fuel, provides the opportunity to evaluate and control the change in order to produce a safe flight outcome.

Failure to search for and recognize change reduces the chance of controlling the change. As time progresses, the alternatives available may decrease, and the option to select the remaining alternatives may be lost. For example, if a pilot elects to fly into hazardous weather, the alternative to circumnavigate the weather is automatically lost.

In the conventional decision making process, a change may indicate some action by the pilot is required. A change from normal events, or from expected events, or from desired events should alert the pilot to

that action. There sometimes is a difference between what you expect to happen (implying certainty) and what you hope will happen (implying uncertainty). For example, you depart on a flight into marginal weather, hoping that conditions will improve.

The occurrence of change must be detected before a response can be selected. There can be instances when a change may remain undetected for some time. A good example is a pilot who fails to compare actual groundspeed with the planned groundspeed from the flight log. A change has occurred even though it was not detected until later when the situation became critical and the aircraft was low on fuel.

Selection of the proper response relies on a number of elements that affect every pilot's level of situational awareness. These include a pilot's physical flying skills, knowledge, experience and training.

#### Skills

All experienced pilots can recall their first days as a student pilot. All of their energies were devoted simply to controlling the aircraft. Little time remained for traffic watch, navigation, or deep thoughts about the philosophical aspects of the art of flying. As a result, their awareness of the situation was often extremely low. Many of them are alive today only because their awareness was just high enough to cope with the situations which developed during their initial flight training.

Experienced pilots generally possess greatly improved skills and procedures. Thus many of these actions become almost automatic. As a result, they are able to devote much less of their time to physically flying the aircraft and more time to the mental aspects of flying. Their skills are, nevertheless, still extremely important. They must always attempt to sharpen these skills to ensure that more of their energies can be devoted to other important flying tasks.

#### Knowledge

Knowledge is the next defense against poor judgment in conventional decision making. Pilots must base the overall safety of any flight on their basic knowledge of the aircraft, the environment (including ATC procedures), the route being flown, weather, etc. They can prepare themselves to detect change by accomplishing thorough preflight preparation and planning, e.g., preparing a flight log, reviewing aircraft performance, calculating weight and balance, obtaining a complete weather briefing, etc. During the flight, the information prepared during preflight planning can be compared to the conditions encountered to determine if anything has changed which might affect the safe completion of the flight.

#### Experience and Training

Experience is practical knowledge, skill, or practice derived from direct observation of, or participation in, events or in a particular activity. We draw upon our experience every time we fly. In a sense, experience creates a mental file that helps pilots establish how conditions and events are interpreted and how they respond to them.

Many of the actions taken while flying are based on experience. Airmen constantly rely on experience to determine the correct action required for a given situation. In this way, experience allows them to solve problems quickly and therefore devote more time to other problems requiring their attention.

Many problems faced by pilots are, in fact, solved before boarding the aircraft. By constantly reviewing certain emergency procedures, problems are solved simply by using experience to select the appropriate solution. The procedures associated with an engine failure on takeoff become almost automatic to the carefully trained pilot.

Experience and training are closely related. Training is more than simply an effort to perfect our systems knowledge and physical flying skills. Training is highly structured and represents the most efficient way to build experience.

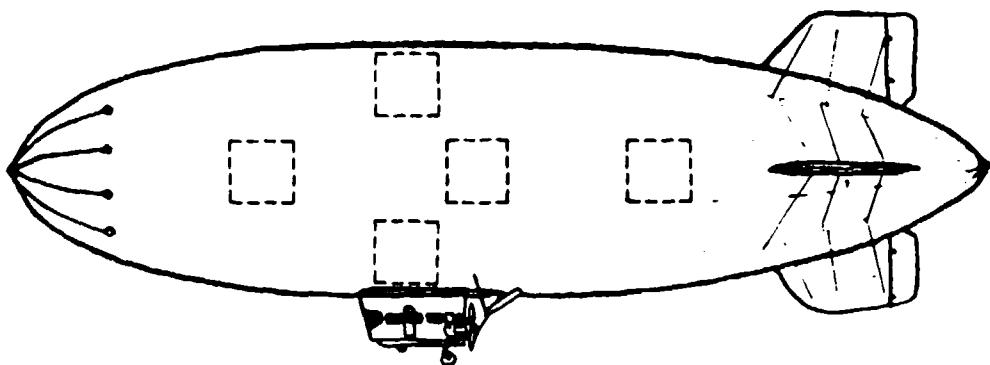
However, conventional training programs tend to focus on skills and procedures (how to manipulate controls, performing the specific procedures for operating installed equipment, etc.) with only a minimal emphasis on headwork (how to make rational, systematic decisions based on situational conditions). Unfortunately decision making skills are often developed informally by listening to "hangar flying" or "bull sessions" and many times through narrow escapes (experience). In addition to this informal "training", better instructors and training programs always discuss previous accidents (case studies) so pilots can learn about the mistakes of others. But most of this "training" is unstructured and haphazard. This new program is intended to provide a systematic approach to improved decision making.

The following drills are designed to illustrate the types of mental activity associated with flying. Take a few minutes with a pencil to work through them.

Drill 1

Place your signature on the dotted line.

-----



Drill 2

Experienced pilots are all well aware of the importance of the center of gravity (CG) in flying. The lighter-than-air (LTA) pilot has an additional concern when flying a blimp - the center of buoyancy (CB). In simple terms, the static stability of a dirigible is comparable to the action of a pendulum suspended from the center of buoyancy.

Try to determine where the center of buoyancy might be on the blimp illustration above. Do not be concerned that you have little information to go on. Just think carefully and logically about how to solve this problem, then draw the character "S" inside the dotted box that you think corresponds to the CB. Try to reproduce the character exactly.

## Drill Analysis

Two distinct activities were required for the drills just completed:

- Automatic Reaction - Which is analogous to "Skills and Procedures".
- Problem Resolving - Which is analogous to "Headwork".

These mental processes are typical of those employed in every safe helicopter flight.

### Drill 1 -- Automatic Reaction

Did you know that the average signature requires about 40 changes in the direction of the signer's pen? Did you stop and think about changing direction that many times when you did the exercise? Chances are you did not. You automatically signed your name without thinking about exactly how you were doing it. You performed a rather complex activity, without much consideration. Your response was automatic. The first mental process of safe flight is AUTOMATIC REACTION. Automatic reaction is used to maintain ongoing control of the aircraft, such as stabilizing heading and altitude by making small, automatic adjustments to the controls. It may also be used in certain emergency situations where specific, prompt action is required.

Good pilots learn to do many things automatically, simultaneously, and without thinking about each individual act. You have learned skills and procedures that are now more or less automatic reactions for you. When you first practiced them, however, you had to devote a great deal of your attention to them and concentrate in order to perform successfully. Gradually, with more practice, there was a decline and eventual elimination (possibly without your realization) of your need to "think about" what you were doing as these skills became truly automatic reactions.

### Drill 2 -- Problem Resolving

This drill gave you something to do that required you to understand what needed to be done and then figure out how to do it. Once you knew how, you went ahead and did what was required. This second mental process of safe flight is PROBLEM RESOLVING, which can be thought of as a three-step process:

Step 1: Uncover, define, and analyze the problem.

Step 2: Consider the methods and outcomes of possible solutions.

Step 3: Apply the selected solution to the best of your ability.

Since most of you, as pilots, never had to deal with a blimp's center of buoyancy before this, you had to devote some conscious thought to the solution of the problem with which you were confronted. Incidentally, the correct answer will be provided later - keep reading.

Did the unusual character cause you some problem at first? Did it help you to realize this character is actually an inverted figure "5"?

Most people find it helpful to think through a new situation before actually trying to do anything. Also, learning usually takes place more quickly when a connection or an association is realized between the new information and something already learned. Your ability to reproduce the character would probably improve with practice. Similarly, as you gain further flying experience and proficiency you find that you can resolve flight problems more easily and more quickly. Remember, problem resolving is different from automatic reaction in that you actually work through a process instead of just acting.

## CONVENTIONAL DECISION MAKING PROCESS

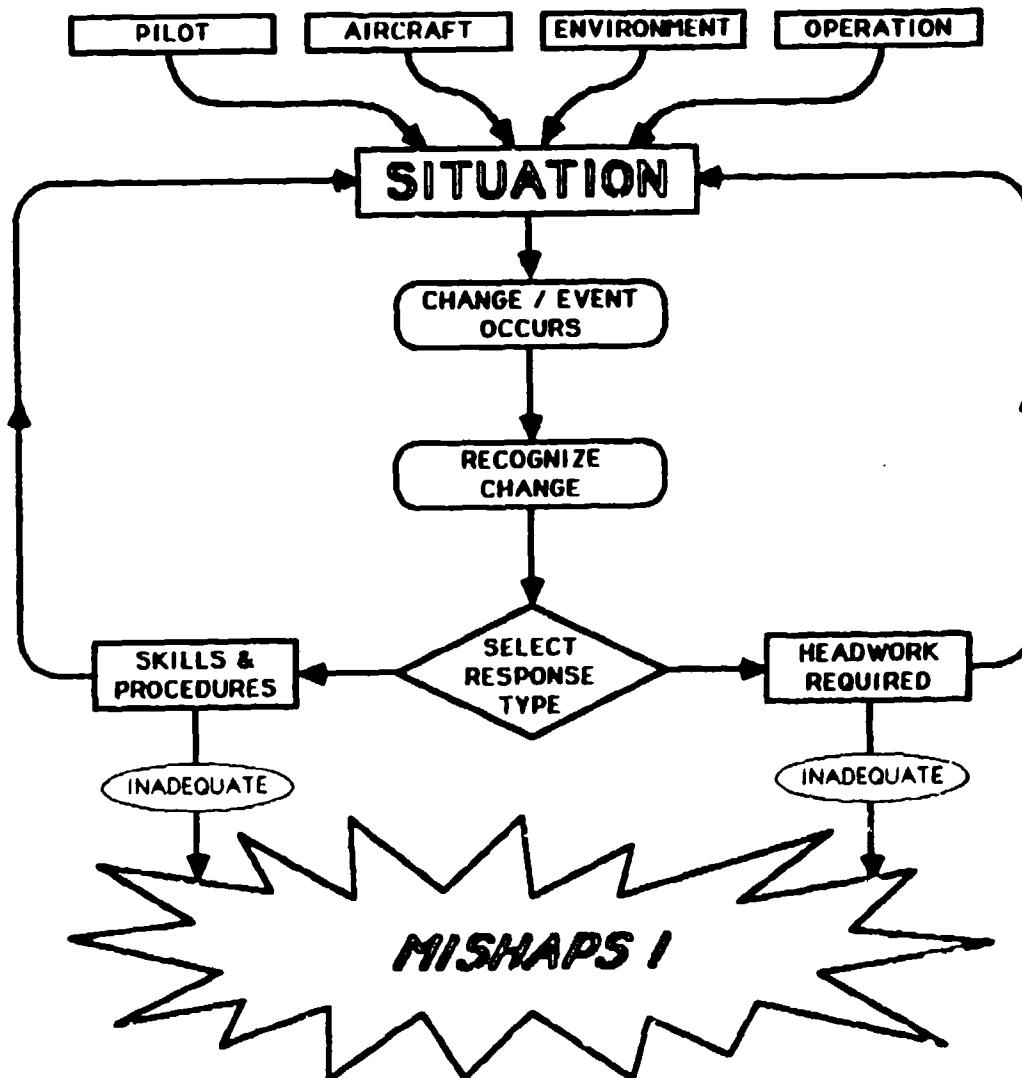


Figure 2.3

As shown in the figure, inadequate skills and procedures or inadequate headwork in conventional decision making leads to mishaps. A review of accident data reveals that there are several categories of

pilot error. These include errors of omission - failing to do something one should have done; and those of commission - doing something one should not have done; timing errors - doing something too soon or too late; errors involving degrees of response - overreacting or underreacting. It is worth keeping these types of mistakes in mind when examining the decision making process.

## AERONAUTICAL DECISION MAKING PROCESS

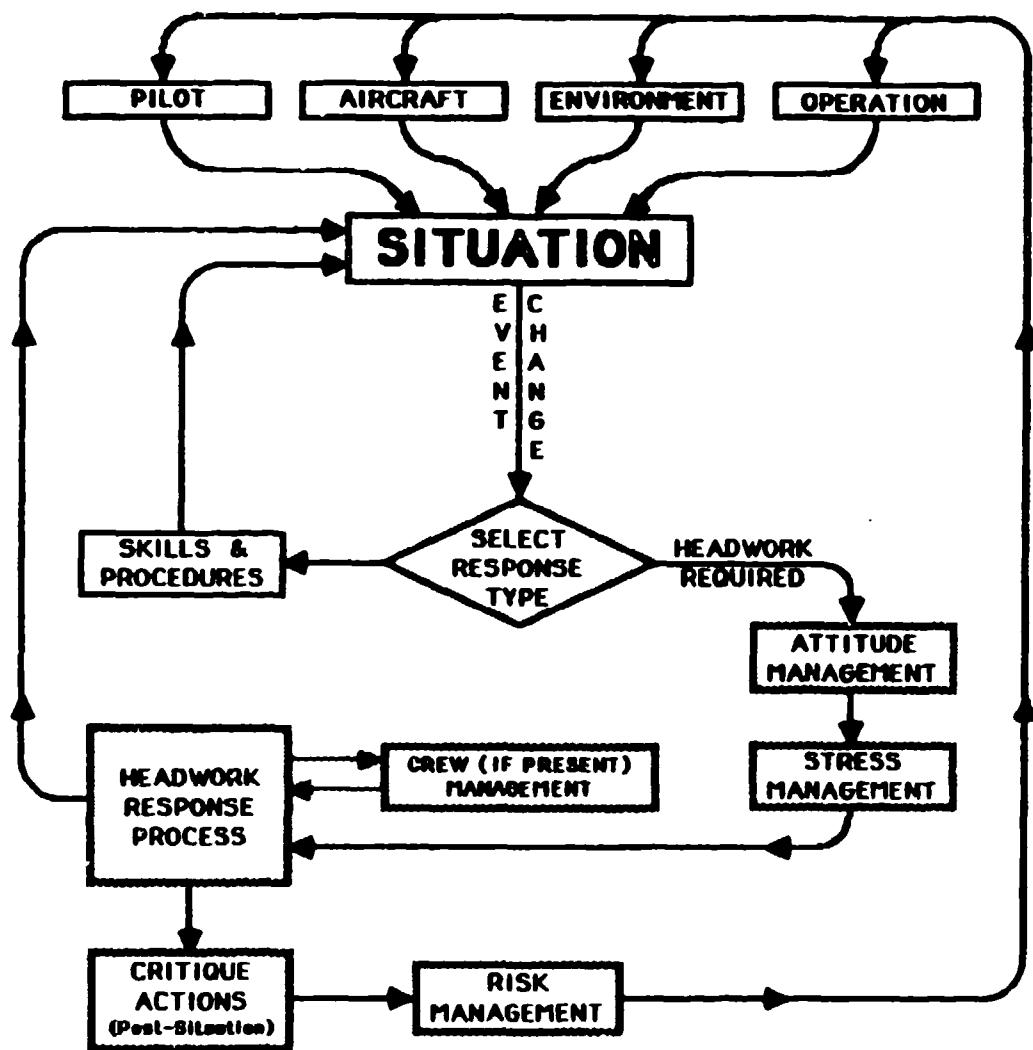


Figure 2.4

Aeronautical Decision Making builds upon the foundation of conventional decision making, but modifies and enhances the process to decrease the probability of pilot error. ADM provides a structured approach to changes occurring during a flight. This structured

approach addresses all aspects of decision making in the cockpit and identifies the elements involved in good decision making. These include:

- 1) Identifying personal attitudes which are hazards to safe flight.
- 2) Learning behavior modification techniques.
- 3) Learning how to recognize and cope with stress.
- 4) Developing risk assessment skills.
- 5) Considering all resources available in a multi-crew situation.
- 6) Evaluating the effectiveness of ones ADM skills.

As in conventional decision making, such decision making skills start with recognition of change, assessment of impact/alternatives, decision to act (or not) and response. The ADM figure illustrates the interactions of these steps and how to produce a safe outcome.

#### Attitude Management

How a pilot handles his or her responsibilities as "pilot-in-command" depends to a large degree upon ingrained attitudes--toward safety, toward him or herself, and toward flying. Attitudes are learned and are not innate behavior. Good attitudes can be developed--again, through training--into a positive mental framework that encourages and produces good pilot judgment. On the other hand, bad pilot thinking habits created by previously learned poor attitudes can be "unlearned" or modified through training.

How positive attitudes toward flying can be learned is one aspect of this judgment and decision making training. This aspect is discussed in detail in chapters 4, 5 and 6 of this manual.

#### Stress Management

Learning how to identify and cope with all aspects of stress which impact decision making is a second important aspect of ADM training. Both general life stress management and flight associated stress management are the topics discussed in Chapter 7. The importance of recognizing the presence of "stressors" in ourselves, the aircraft and the environment must be developed. The impact of stress on decision making is well documented in the helicopter accident statistics. The goal of ADM training is to minimize this impact.

### 3.0 ROTORCRAFT RISK ASSESSMENT

.....A superior pilot is one who stays out of trouble by using superior judgment to avoid situations which might require the use of superior skills.

---

The purpose of this chapter is twofold. The first is to profile the risks associated with flying helicopters. The second to provide a method to assist pilots in managing the major and minor risks identified. No flight can be conducted without risk, so decision making is a continuous process of neutralizing that risk. The pilot should always be the one to take action in order to reduce or eliminate the effect of increased risk, and that action must be monitored to be sure it works.

#### A. ROTORCRAFT RISK FACTORS

In order to accomplish our first objective -- defining the risks associated with helicopter flying -- rotorcraft accident statistics will be reviewed. These statistics can increase your awareness when risk situations which are similar arise during a flight. The statistics also reinforce two old lessons that "accidents don't just happen, people make them happen" and "no new ways of having an accident have been devised in the recent past, people just keep making the same old mistakes."

This section presents facts and statistics from the National Transportation Safety Board (NTSB). Two primary sources of NTSB data are reviewed. These are the "Annual Review of Aircraft Accident Data - U.S. General Aviation - Calendar Year 1981" and the "Special Study - Review of Rotorcraft Accidents 1977-79". The former study provides an overview of the most current rates, causes and types of rotorcraft accidents. The second study provides data on the specific portion of rotorcraft accidents in which the pilot was cited as a cause or factor.

The annual number of rotorcraft accidents has remained fairly constant over the past seven years (see Table 3.1) ranging from 247 to 285 (262 average). Over this same period, estimated flight hours have increased each year, resulting in overall accident rates which show steady and substantial improvement. During 1981, helicopters and helicopter pilots were involved in a total of 257 aircraft accidents, for an all cause rate of 11.16 accidents per 100,000 hours flown. This rate represents a 50% improvement since 1975. The 1.30 per 100,000 hours fatal accident rate in 1981 is a 30% improvement over 1975.

Table 3.1 Helicopter Accident Rates, 1975-1981

Year	Accidents	Hours Flown	Accident Rates Per 1000,000 Hrs Flown	
			Total Rate	Fatal Rate
1975	266	974,000	27.31	1.85
1976	249	1,103,000	22.57	2.36
1977	247	1,170,000	21.11	1.88
1978	285	1,397,000	20.40	2.93
1979	267	1,522,000	17.54	2.30
1980	263	1,891,000	13.91	2.12
1981	257	2,303,000	11.16	1.30

In addition to providing the annual accident rate data for both piston and turbine powered helicopters, the NTSB report also lists, in order of frequency of occurrence, the "most prevalent detailed accident causes" for the two classes of rotorcraft. Table 3.2 summarizes those detailed causes. The table indicates that the pilot was primarily responsible for six of the ten most prevalent causes regardless of rotorcraft type. In addition, the pilot or "Personnel" may be responsible in some Fuel Exhaustion, "Inadequate Maintenance" and "Powerplant Failure" accidents. This leaves only "Material Failure" among the top ten causes that may not be directly controllable by the pilot.

TABLE 3.2 Most Prevalent Detailed Helicopter Accident Causes -- 1981

		Turbine		Piston		All Rotorcraft	
		Number	Percent	Number	Percent	Number	Percent
1.	Pilot Inadequate Preflight Preparation and/or Planning	14	17.9	16	8.9	30	11.7
2.	Powerplant Failure	8	10.3	20	11.2	28	10.9
3.	Powerplant Failure for Undetermined Reason	6	7.7	16	8.9	22	8.6
4.	Pilot Failed to Maintain Adequate Rotor RPM	4	5.1	18	10.1	22	8.6
5.	Pilot Failed to See and Avoid Objects or Obstructions	6	7.7	14	7.8	20	7.8
6.	Pilot Improper Operation of Flight Controls	3	3.8	14	7.8	17	6.6
7.	Pilot Mismanagement of Fuel	8	10.3	9	5.0	17	6.6
8.	Fuel Exhaustion	8	10.3	9	5.0	17	6.6
9.	Personnel-Inadequate Maintenance & Inspection	4	5.1	10	5.6	14	5.4
10.	Pilot Inadequate Supervision of Flight	0	0	14	7.8	14	5.4

Knowing the phase of flight operations in which accidents occur can also increase pilot awareness when evaluating flying risks. Table 3.3

lists helicopter accidents by phase of flight and indicates that during the most recent year (1981) and the preceding five year period (1976-1980) the majority of accidents occurred "Inflight". The percentages were 56.4% ('81) and 57.4% in 1976-80. This percentage of accidents in the cruise flight phase was significantly higher than for fixed wing accidents. In 1981 approximately 35% of the fixed wing accidents occurred during inflight operations.

Table 3.3 Phase of Operation for Accident-Involved Aircraft  
all Rotorcraft 1981 and 1976-1980

<u>Phase of Operation</u>	1976-1980		1981	
	<u>Mean</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
Inflight	150.4	57.4	145	56.4
Landing	52.6	20.1	65	25.3
Takeoff	43.8	16.7	35	13.6
Taxi	9.6	3.7	10	3.9
Static	4.2	1.6	2	0.8
Not Reported	<u>1.6</u>	<u>0.6</u>	<u>0</u>	<u>0.0</u>
Total	262.2	100.0	257	100.0

Finally, it is important to associate the flying risk with the major risk factors in helicopter flying in order to prioritize actions and balance those risks. Table 3.4 presents the NTSB summary of broad cause/factor assignments for all rotorcraft accidents in 1981 and in the 1976-80 periods. This table clearly shows that for both periods the pilot was the major risk element in the safety of flight equation. Approximately 64% of all rotorcraft accidents are related to the pilot cause factor over the past six years. This percentage is greater than the sum of the next three highest cause/factors for both time periods. However, terrain, powerplant and rotorcraft encompass both the environment and aircraft subject areas and should also be noted as significant risk elements. Finally, cause/factor numbers 5 and 6 in Table 3.4 -- personnel and weather -- are also significant risk elements. Together, these top six helicopter accident cause/factors:

- Pilot
- Terrain
- Powerplant
- Rotorcraft
- Personnel
- Weather

provide the major risks associated with helicopter operations. However, since the pilot dominates these six it is certainly beneficial to better understand what is included under this category of cause/factor.

Table 3.4 Broad Cause/Factor Assignments - All Accidents  
For Rotorcraft  
1981 and 1976-1980

<u>Broad Cause/Factor</u>	<u>1976-1980</u>		<u>1981</u>	
	<u>Mean</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
1. Pilot	170.8	65.1	163	63.4
2. Terrain	68.6	26.6	48	18.7
3. Powerplant	56.2	21.4	63	24.5
4. Rotorcraft	40.8	15.6	40	15.6
5. Personnel	34.6	13.2	40	15.6
6. Weather	30.4	11.6	37	14.4
7. Miscellaneous	16.2	6.2	21	8.2
8. Undetermined	9.6	3.7	9	3.5
9. Instruments/Equipment and Accessories	2.2	0.8	2	0.4
10. Systems	1.6	0.6	4	1.6
11. Airport/Airways/Facilities	1.4	0.5	3	1.2
12. Airframe	1.2	0.5	0	0.0
13. Landing Gear	1.0	0.4	2	0.8
No. of Accidents with Cause(s) Assigned		257	262.2	

#### B. THE PILOT RISK FACTOR

In order to focus the analysis on the pilot associated risks in helicopter flying, the more detailed NTSB "Special Study-Review of Rotorcraft Accidents 1977-79" will be used. During this three year special study period, there were 890 rotorcraft accidents including 125 fatal accidents.

The pilot was cited as a cause or factor for more than 64 percent of the total rotorcraft accidents, and 60 percent of all fatal rotorcraft accidents. However, in accidents where the pilot was cited as a cause or factor, the rate of accidents per 100,000 flying hours is the same as the rate for fixed wing aircraft (8.6/100,000 hrs). Therefore, if we can isolate the risk factors which contributed to the pilot's error, they might also apply to general aviation accidents in which the pilot was cited as a cause or factor. Figure 3.1 provides a summary of the three main pilot cause factor categories.

These three main factors in Pilot risk assessment are:

- (1) Operational/Technique
- (2) Decision/Judgment
- (3) Perceptual

These factors can be analyzed in detail to provide an understanding of the underlying hazards of helicopter flying and the associated risk drivers.

## ACCIDENTS

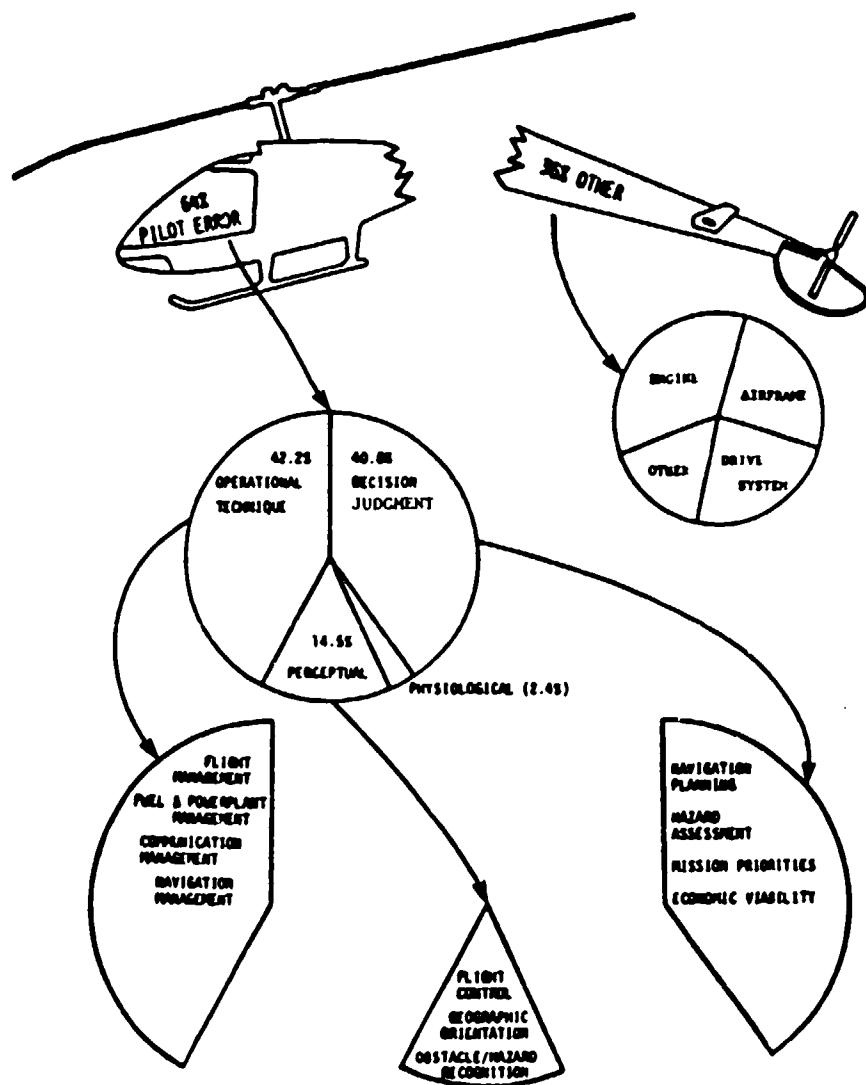


Figure 3.1 Pilot Cause/Factors in Rotorcraft Accidents

### 1. Pilot Operational/Technique Errors

The three subcategories which accounted for almost 92 percent of all accidents in the Operational/Technique category are:

- (1) Failed to maintain rotor rpm or flying speed
- (2) Improper use of flight controls, etc
- (3) Failed to see and avoid obstacles

Previous research into the pilot cause/factor, "failed to maintain rotor rpm or flying speed", determined that this occurs mostly during landing, but also occurs in takeoff and hover, and occasionally during the cruise phase. This risk category is often associated with accidents involving autorotation. Thus, the causes of autorotation were studied in more detail revealing that the most prevalent causes of unplanned autorotational accidents are: engine failures, fuel exhaustion, and fuel contamination. These 3 factors accounted for over 95 percent of the unplanned autorotational accidents. The high rate of engine failures suggests that there is a dire need for powerplant design review and improvement from both a maintenance and a reliability viewpoint. Fuel exhaustion arises from poor powerplant management, or inadequate preparation and/or planning. The "improper use of flight controls, etc." can be linked to pilot flying procedures. In addition, this cause/factor can also be related to the different types of rotorcraft that a pilot flies, and the lack of standardization of flight controls associated with those different types of rotorcraft. An extreme example of the consequences of non-standardization was cited in the May 1979 issue of Rotor & Wing International Magazine. In the article, the pilot inadvertently dropped a slingload containing \$30,000 worth of electronic equipment. Upon landing, the pilot stated that "there must have been some type of electrical failure in the system, because the load dropped when I pressed the force-trim release on the cyclic". In actuality, the pilot had just hired on with the company and, at his last job, the force-trim release button and the slingload button were reversed from the configuration he was currently flying. Fortunately, there were no injuries or fatalities associated with this accident. However, everyone in the helicopter industry is aware of many cases where non-standardization has been a problem or even an underlying cause related to an incident or accident.

The final pilot Operational/Technique error category to be analyzed is the cause/factor, "failed to see and avoid obstacles". This risk element could be related to insufficient training, fatigue and/or excessive pilot workload. For example, during aerial application missions, the pilot is required to fly at low altitudes, amidst wires, trees and other hazards while performing tight turns. These missions frequently last four or more hours. The pilot typically performs this mission in an unstabilized, vibrating machine designed over twenty years ago. He must not only perform the flight control and powerplant management function but monitor navigation, altimetry and engine instrumentation. All of this while maintaining his responsibility to "see and avoid" both other aircraft and obstacles.

## 2. Pilot Decision/Judgment Errors

Table 3.5 shows the percentages of pilot errors for the subcategories cited under the decision/judgment category for fatal accidents and all accidents. The three subcategories shown in the table which accounted for more than 55 percent of all accidents in the decision/judgment category were:

- (1) Inadequate preflight preparation
- (2) Inadequate supervision of flight or diverted attention from flight, and
- (3) Mismanagement of fuel.

Table 3.5 Pilot Decision/Judgment Cause/Factors in Rotorcraft Accidents

Detailed Cause/Factor	Percent of Fatal Accidents	Percent of All Accidents
Inadequate preflight preparation	12.7	28.4
Inadequate supervision of flight or diverted attention from flight	9.1	14.7
Mismanagement of fuel	7.3	12.2
Initiated or continued VFR flight into adverse weather	20.0	6.9
Selected unsuitable terrain	1.8	6.9
Failed to follow approved procedures	9.1	6.6
Other	25.5	15.0

As was the case in the last class of Operational/Technique caused accidents, these three major cause/factors can be related to either specific missions or specific parts of a mission. In the case of inadequate preflight preparation, there are at least three possible root causes or hazards:

- (1) Inadequate instruction and/or training
- (2) Poor pilot attitude and/or motivation
- (3) Excess demands on the pilot's time.

All of these underlying risks are related to the subject area Pilot as defined in Chapter 2. The means of analyzing the pilot risks are presented in Chapters 4, 5 and 6.

The remaining Decision/Judgment accident causes are closely related. Inadequate supervision of flight, diverted attention and mismanagement of fuel are all commonly related to unacceptable levels of pilot workload. Whether the workload is induced by outside causes (ATC, traffic, etc.) or induced by the pilot's poor flying procedures and techniques (navigation, flight control operation/trim, fuel management, etc.), this group of cause/factors can be influenced by training.

### 3. Pilot Perceptual Errors

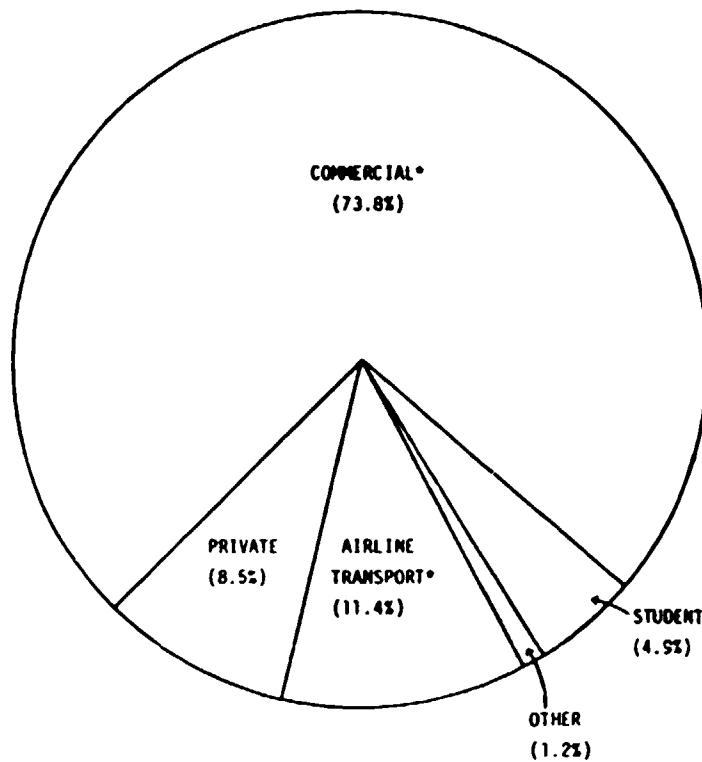
In the perceptual category the primary pilot errors include: misjudged speed, altitude, clearance, or distance. The causes of these pilot errors are, in some cases, complex and difficult to resolve. In other cases, these errors are simply the result of carelessness. Every rotorcraft mission is unique in that the pilot has to operate the equipment in an environment where many changing variables affect an individual pilot's ability to cope with the responsibilities of the task. Missions of this type could conceivably be reduced in complexity by redesigning the cockpit to overcome the difficulties of a given mission category. Then again, the pilot could be on a mission that he is completely capable of performing, but perhaps is preoccupied with other outside problems such as communications, terrain avoidance, etc. Finally, the pilot could be on a mission with which he is inexperienced, in which case the workload associated with the learning process causes judgment errors in the basic flight parameters.

The most difficult pilot perception problem occurs during the approach to landing phase of flight. The basic risk associated with this phase results from the helicopter being operated in areas other than airports/heliports. In congested urban areas, remote areas, offshore areas, mountainous regions and in natural resource exploration areas such as Alaska and Canada, the pilot must often make an approach to landing and land safely in unfamiliar and/or restricted terrain. The judgment involved in setting up such an approach includes assessing not only the available clear area, but also the height of surrounding trees, terrain, wind direction and speed, etc. Based on this assessment, the pilot selects approach angle, airspeed, flight heading and approach distance. Frequently during these steep approaches (15-20 degrees) the pilot misjudges closure rate and/or altitude, gets "behind" the helicopter and in trying to save the approach crashes the tail rotor into the ground, surrounding trees or an obstruction.

### 4. Pilot Training/Skill Data

Figure 3.2 shows the breakdown of types of certificates held by the pilot at the time of the rotorcraft accident. From the figure it can be seen that the majority of rotorcraft accidents occurred with pilots flying in a professional capacity. That is, more than 85 percent of the pilots held commercial or airline transport pilot certificates. Figure 3.3 shows the distribution of accidents in relation to the kind of flying. Aerial application flying accounted for more than one-fourth of the accidents, while personal/business and air taxi operations were the next most common kinds of rotorcraft accidents. The prevalence of aerial application rotorcraft accidents can be linked to the hazards that these pilots face during this kind of flying. However, aerial application flying has the lowest fatality rate, which is associated

with the relatively small impact forces attained during accidents at low speed and at low altitude.



\*/NOTE/: Also contains pilots with flight instructor ratings.

**Figure 3.2 Type of Certification Held by Pilot in Rotorcraft Accidents**

Exactly 75 percent of the pilots were between the age of 26 and 45 years old, however, no conclusions can be made in regard to pilot age and accident rate without nonaccident pilot-age data (exposure). Analyses of pilots total flying time and time in type indicates that the majority of the accident pilots should have been fairly familiar with their equipment. More than 77 percent of the accident pilots had more than 500 total hours flown and more than 50 hours in type. Additional analyses of rotorcraft accident related pilot experience include:

- (1) Almost 69 percent of pilots had more than 50 hours in last 90 days.
- (2) Approximately 73 percent of pilots had more than 100 hours time in type.
- (3) More than 62 percent of the pilots flying in IFR weather conditions were not instrument rated!!

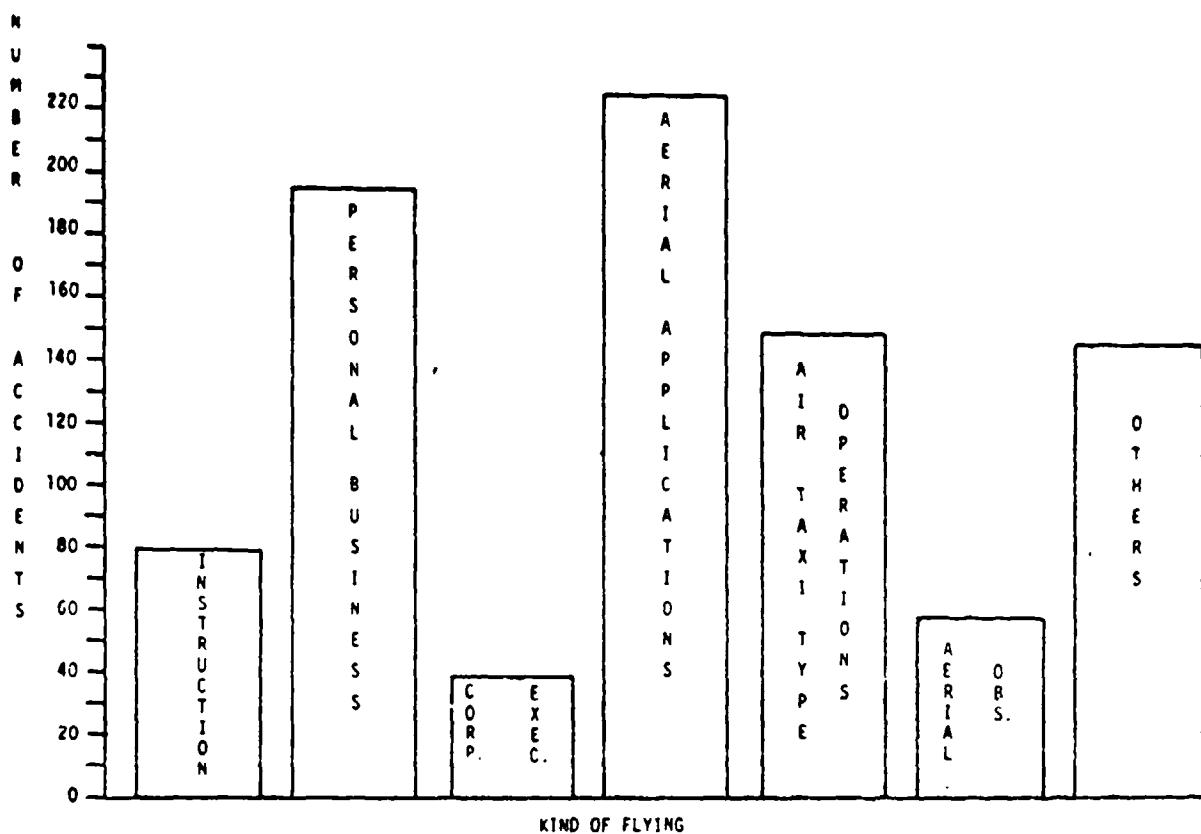


Figure 3.3 Distribution of Accidents in Relation to Kind of Flying

#### C. ADDITIONAL RISK FACTORS

This section describes other pertinent statistics, cited in the NTSB rotorcraft study, regarding rotorcraft accidents. Of the 890 rotorcraft accidents studied in the report, more than one-fourth of these rotorcraft were destroyed, and almost 9 percent of these accidents resulted in fire after impact. Engine failure or malfunction was the most frequent accident type, and accounted for almost 29 percent of all rotorcraft accidents. Collisions with obstacles and collision with ground or water account for 18 percent and 16 percent respectively. The 3 major types of accidents which resulted in the greatest percent of fatal accidents were:

- (1) Collisions between aircraft inflight
- (2) Airframe failure inflight, and
- (3) Tailrotor failures.

Almost 56 percent of all rotorcraft accidents occurred during the

inflight phase of operation, while landings and takeoffs accounted for 20.2 and 17.8 percent respectively. Furthermore, the inflight phase of operation represents approximately 68 percent of all fatal accidents.

#### D. ACCIDENT ENVIRONMENT

The environment in which accidents occur can often be a factor in the cause of accidents, although, for the 1977-1979 time period, the environment was never a cause for a fatal accident. The most frequently cited weather condition cause/factor of accidents was unfavorable wind conditions. However, fog, low ceiling, and rain were the most common weather conditions cited as a factor in fatal rotorcraft accidents. More than 90 percent of the accidents occurred during the daylight time and 93 percent of these accidents occurred with visibility conditions of 5 miles or greater. More than 96 percent of the accidents occurred under VFR weather conditions. Most accidents occur during the months May through September. Although this probably reflects the increased usage of rotorcraft during these months, it also may reflect the impact of higher density altitudes and increased thunderstorm activity during the summer. In rotorcraft accidents, where terrain was cited as a cause/factor, high obstructions accounted for more than 72 percent of fatal accidents and more than 46 percent of all accidents.

#### E. BALANCING RISK WHILE FLYING

Chapter 2 presented the four basic risk elements which are important elements in assessing risk. Remember most accidents do not result from a single bad decision. It's usually a series of mistakes, "a POOR JUDGEMENT chain", which typically leads to a mishap. Pilots need to have a systematic way of knowing where to look for risk. Two basic risk principles have been observed repeatedly in decision making accidents. These are:

##### 1. One bad decision often leads to another.

The decision chain is triggered by recognition that something has changed, or an expected change did not occur in the four subject areas. The search for, and recognition of change, e.g., groundspeed, weather, and fuel, provides the opportunity to evaluate and control the change in order to produce a safe flight outcome, if this information is accurate. However, one poor decision, e.g., inaccurate assessment of deteriorating weather, increases the availability of false information which may then negatively influence decisions which follow.

##### 2. A series of bad decisions reduces the alternatives for continued safe flight.

Failure to search for and recognize change reduces the chance of controlling the change. As time progresses, the alternatives available may decrease, and the option to select the remaining alternatives may be lost. For example, if a pilot elects to fly into hazardous weather, the alternative to circumnavigate the weather is automatically lost.

The preceding sections characterized the specific risk factors associated with each of these areas as:

P -- Procedures, Training, Experience, Complacency, Physical Stress, Health, Fatigue, Psychological Stress, Workload (spare mental capacity)

A -- Powerplant, Cockpit Design/Standardization, Endurance, Performance Limits, Handbooks, Maps, Damage Tolerance, Crashworthiness

E -- Obstacles, Traffic, Terrain, Weather, ATC System, Heliports/Airports, Navaids

O -- Mission Purpose, Criticality & Duration, Frequency of Take-offs and Landings, Duty Cycle

In considering all the expected aspects in risk management, another category is suggested which is in essence the combination of the other four. This fifth risk category we shall call "situation". Pilots should consider this paraphrase of a familiar axiom: The actual risk is usually greater than the sum of each risk factors.

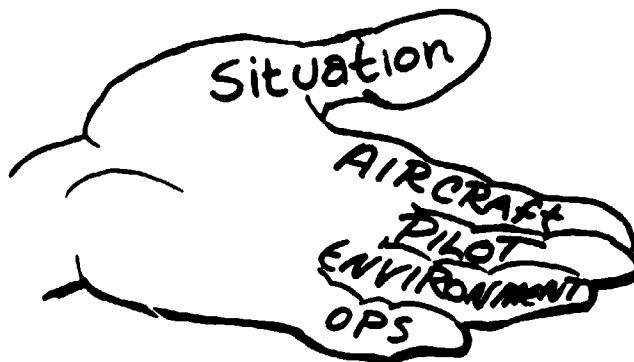
You as a pilot have the major controlling force in determining the relative risk of any particular flight situation. If you habitually use the ADM process your risk will be greatly diminished through increased situational and personal awareness. However, circumstances may still arise due to unpredictable events (ATC, system failures, mistakes, etc.) which require risk management evaluation.

When evaluating risks, a developing or potential hazard must first be detected, then the five risk elements must be qualitatively analyzed. The analysis should consider the pilot's relative ability to cope with changes in each basic risk element for the existing situation. As an aid in evaluating and weighing the risk factors both before and during each flight the following technique is suggested.

Deal Yourself A Good Hand

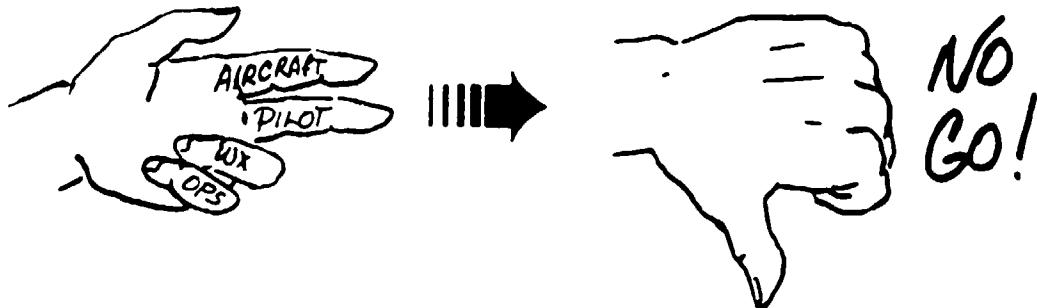
A positive step in good aeronautical decision making is properly deciding whether or not to conduct a particular flight (or continue a flight as planned). To ensure you have dealt yourself a good hand requires conscious assessment of your current situation. Assume your evaluation of each element of the five risk factors is now a "go"/"no go" decision.

Assign each risk factor to one of your fingers as shown below:



Start with a closed fist and raise one finger for each area that is a "go" considering its importance for this particular flight at this particular time.

If you end up with less than a full hand with all fingers extended, consider not going or changing the "no go" risk factor; e.g., wait for better weather, utilize a more capable aircraft, or take a passenger along who can ease your workload by performing navigation or communication functions.



To illustrate the use of this "good hand" process in risk assessment, let's discuss the situation of a noninstrument-rated pilot who encounters deteriorating weather conditions inflight.

A noninstrument rated private pilot is on a VIP flight from Plattsburg New York to his corporate headquarters in Toronto, Canada a route he flies frequently. He prepares for the flight by estimating fuel requirements and calculates that if he flies nonstop at 2,500 feet in order to avoid the higher winds aloft, he would have 20 minutes of fuel remaining at his destination. The flight service station briefer indicates that a weak front will be near Buffalo, but ceilings are forecast to remain above 4,000 feet with possible isolated afternoon thunderstorms. He expects to be able to see these storms even from his relatively low cruising altitude and decides that he will be able to go around any storms encountered enroute.

The flight departs at 5:00 pm, two hours late because the passenger was "hung-up" in meetings. By 7:30 pm, they are halfway home and notice lightning flashing in the distance illuminating a large area of thunderstorms. It is dark, and the helicopter unexpectedly flies through the edges of a few clouds. The pilot resorts to instrument flying momentarily to get back to VFR conditions. The situation is not what he expected. He determines that a trend has established and starts to assess the situation.

The pilot - He is not instrument rated; his VIP passenger is not a pilot and does not particularly enjoy flying. His last biennial flight review was over one year ago. This is clearly a "no go" risk factor.

The aircraft - His helicopter is instrument equipped and everything is fully operational; however, he is a little behind his fuel plan due to dodging clouds. If he climbs above the clouds, his fuel plan will change for the worse due to the higher headwinds (marginal "go" factor).

The environment - The weather is worse than forecast. The "weak" front seems to be quite solid and the scattered cumulus have become broken. He cannot legally fly IFR. He doesn't know the current weather ahead and his passenger is getting anxious. Definitely a "no go" risk factor.

The operation - The purpose of this flight was rather routine. Although there was a VIP aboard there was no real reason why this individual could not be inconvenienced by diverting to an alternate or turning back. Hopefully he will understand that the dangers involved are not worth taking chances in this kind of weather. Also indicates "no go".

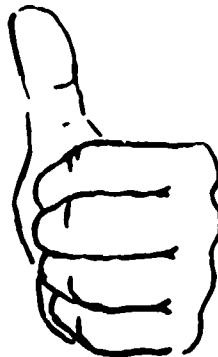
Based on the three out of four no go risk level, the pilot starts to determine how he can change his risk. The weather behind him is VFR and there are airports and heliports with good facilities where they can spend the night. A retreat to one of these would result in an immediate improvement in his feelings about the environment outside, his awareness of the total situation and the anxiety of his passenger. A turn to better VFR conditions and a diversion to a VFR airport within 30 minutes flying achieves a large drop in criticality since he has an hour and a half of fuel remaining.

Having detected the problem, assessed the risk and identified alternatives, the pilot decides to turn around. A check of the weather confirms that Buffalo is under an area of severe thunderstorms. The pilot checks the weather at the new destination and compares the time required to his fuel remaining. This is the fifth and final step of the decision-making process, i.e., monitoring the revised plan to be certain that it works.

#### SUMMARY

Good pilot decision making depends on an understanding of, and an ability to use, an orderly decisionmaking process. We need to convince students that being a good decision maker in aviation does not mean

acting hastily based upon "gut" feelings (or instinct). With an accurate assessment of the risks associated with each of the four risk elements, pilots are better able to arrive at decisions that ensure a successful conclusion to a flight, even if it means not taking off. Success in decisionmaking is measured very simply; maintaining the pilot, passengers and aircraft in good health and condition no matter the airport at which the takeoff and landing occurs.



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.....Learning how to recognize change, methodically assessing the impact and acting to control risks leads to improved safety of flight.

#### 4.0 SELF-ASSESSMENT OF HAZARDOUS ATTITUDES

In this chapter you will learn about the five hazardous attitudes affecting pilot judgment and how to understand how they may impact your flying. In subsequent chapters, you will learn ways to limit your own hazardous attitudes and to reduce the effects of high stress.

As a first step, you are now to take a self-assessment inventory to give you a personal insight for the following discussions and training. This information is only for your own use. It is not intended to be shared with your flight instructor or anyone else, unless you choose to do so.

This assessment asks you to decide why you, as a pilot, might have made certain decisions. Ten situations will be presented, each involving a flight decision. After each situation, you will find a list of five possible reasons for a decision. No "correct" answer is provided for any of the 10 situations. You may indeed be correct in believing that a safe pilot would not choose any of the five alternatives. Be assured that most people know better than to act as described in the situations. Just recognize that the inventory presents extreme cases of incorrect pilot decisionmaking to help introduce you to the five special types of hazardous attitudes described later in the chapter.

##### Instructions:

##### Attitude Inventory

1. Read each of the situations and five alternatives. As you read, try to place yourself in a familiar helicopter under the given circumstances.
2. Choose your most likely thought pattern in response to the situation and place a "1" in the space provided next to that alternative.
3. Continue by placing a "2" beside your next most probable thought pattern and the "3", "4", "5", in order of your next to least likely thought patterns.
4. Complete all ten situations and be certain to fill blank.

Remember -- This questionnaire has no correct answers and is intended for your information only. Some (or all) of the alternatives given may not represent the way you would normally think. However, for this questionnaire you should assign a rank to all of them.

## A. ASSESSMENT INVENTORY

### Situation 1

You are on a flight to an unfamiliar, rural construction site. Flight service states that VFR flight is not recommended since heavy coastal fog is forecast to move into the destination area about the time you expect to land. You first consider returning to your home base where visibility is still good but decide instead to continue as planned and land safely after some problems. Why did you reach this decision?

- a. You hate to admit that you cannot complete your original flight plan.
- b. You resent the suggestion by flight service that you should change your mind.
- c. You feel sure that things will turn out safely, that there is no danger.
- d. You reason that since your actions would make no real difference, you might as well continue.
- e. You feel the need to decide quickly so you take the simplest alternative.

### Situation 2

While going through translational lift on takeoff, you notice an unusual stiffness in the tail rotor pedals. Once airborne, you are sufficiently concerned about the problem to radio for information. Since strong winds are reported at your destination, an experienced pilot who is a passenger recommends that you abandon the flight and return to your departure airport. You choose to continue the flight and experience no further difficulties. Why did you continue?

- a. You feel that suggestions made in this type of situation are usually overly cautious.
- b. Your control of the tail rotor has never failed before, so you doubt that it will this time.
- c. You feel that you can leave the decision to the tower at your destination.
- d. You immediately decide that you want to continue.
- e. You are sure that if anyone could handle the landing, you can.

### Situation 3

The regular helicopter you fly has been grounded because of an airframe problem. You are scheduled in another helicopter and discover it is a model you are not familiar with. After your preflight you decide to take off on your business trip as planned. What was your reasoning?

- a. You feel that a difficult situation will not arise so there is no reason not to go.
- b. You tell yourself that if there were any danger, you would not have been offered that helicopter model to fly.
- c. You are in a hurry and do not want to take the time to think of alternate choices.
- d. You do not want to admit that you may have trouble flying an unfamiliar helicopter.
- e. You are convinced that your flight instructor was much too conservative and pessimistic when he cautioned you to be thoroughly checked out in an unfamiliar helicopter.

#### Situation 4

You were briefed about possible icing conditions but did not think there would be any problem since your heliport surface temperature was 60°F (16°C). As you near your destination, you encounter freezing precipitation, which clings to your windscreens. Your passenger, who is a more experienced pilot, begins to panic. You consider turning back to the original heliport but continue instead. Why did you not return?

- a. You feel that having come this far, things are out of your hands.
- b. The panic of the passenger makes you "commit yourself" without thinking the situation over.
- c. You do not want the passenger to think you are afraid.
- d. You are determined not to let the passenger think he can influence what you do.
- e. You do not believe that the icing could cause your helicopter to crash in these circumstances.

#### Situation 5

You do not bother to check weather conditions at your destination. Enroute, you encounter headwinds. Your fuel supply is adequate to reach your destination, but there is almost no reserve for emergencies. You continue the flight and land with a nearly dry tank. What most influenced you to do this?

- a. Being unhappy with the pressure of having to choose what to do, you make a snap decision.
- b. You do not want your friends to hear that you had to turn back.
- c. You feel that flight manuals always underestimate the safety margin in fuel tank capacity.

- d. You believe that all things usually turn out well, and this will be no exception.
- e. You reason that the situation has already been determined because the destination is closer than any other heliport.

#### Situation 6

You are 40 minutes late for a trip in a light single-engine helicopter, and since you experienced no problems on the previous day's flight, you decide to skip most of the preflight check. What leads you to this decision?

- a. You simply take the first approach to making up time that comes to mind.
- b. You feel that your reputation for being on time demands that you cut corners when necessary.
- c. You believe that some of the preflight inspection is just a waste of time.
- d. You see no reason to think that something unfortunate will happen during this flight.
- e. If any problems develop, the responsibility would not be yours. It is the maintenance of the helicopter that really makes the difference.

#### Situation 7

You are to fly a helicopter which you know is old and has been poorly maintained. A higher than normal T.O.T. on start up is indicated, and you suspect the fuel control. Two fellow company pilots, who are travelling as passengers, do not want to be delayed. After five minutes of debate, you agree to make the trip. Why did you permit yourself to be persuaded?

- a. You feel that you must always prove your ability as a pilot, even under less than ideal circumstances.
- b. You believe that regulations overstress safety in this kind of situation.
- c. You think that the fuel control will certainly last for just one more flight.
- d. You feel that your opinion may be wrong since the two other pilots are willing to take the risk.
- e. The thought of changing arrangements is too annoying, so you jump at the suggestion of the other pilots.

#### Situation 8

You are on final approach when you notice a large unidentified object on the far side of the landing zone (LZ). You consider going around, but your

co-pilot suggests landing anyway since the LZ is "obviously large enough." You land, with your rotor tips just 10 feet from the obstacle. Why did you agree to land?

- a. You have never had an accident, so you feel that nothing will happen this time.
- b. You are pleased to have someone else help with the decision and decide your co-pilot is right.
- c. You do not have much time, so you just go ahead and act on your co-pilot's suggestion.
- d. You want to show your co-pilot that you can control the helicopter precisely.
- e. You feel that the regulations making the pilot responsible for the safe operation of the helicopter do not apply here since it is the ground crews responsibility to assure sufficient landing area.

#### Situation 9

You have just set up on a long final for a landing in an unimproved LZ. As you get closer, you see that the wind has changed, blowing from right to left. You make two sharp turns and land on a heading almost 90 degrees from the original. What was your reasoning.

- a. You believe you are a really good pilot who can safely make sudden maneuvers.
- b. You believe your flight instructor was overly cautious when insisting that a pilot must go around rather than make sudden course changes while on final approach.
- c. You know there would be no danger in making the sudden turns because you do things like this all the time.
- d. You know landing into the wind is best, so you act as soon as you can to avoid a crosswind landing.
- e. The unexpected wind change is a bad break, but you figure if the wind can change, so can you.

#### Situation 10

You have flown to your destination heliport only during daylight hours in the past and believe that you know it well. In your preflight inspection you find that your helicopter needs a minor repair which will delay you so that your arrival will be well after dark. Even though a good portion of the flight will be after dark, you feel that you should be able to recognize some of the lighted landmarks. Why did you decide to make the flight?

- a. You believe that when your time comes you cannot escape, and until that time there is no need to worry.

\_\_\_\_ b. You do not want to wait to study other alternatives, so you carry out your first plan.

\_\_\_\_ c. You feel that if anyone can handle this problem, you can do it.

\_\_\_\_ d. You believe that the repair is not necessary. You decide you will not let recommended but minor maintenance stop you from getting to your destination.

\_\_\_\_ e. You simply do not believe that you could get off course despite your unfamiliarity with ground references at night.

Scoring Instructions

From your attitude inventory answer, write in the table below your rank for each alternative shown. Sum the ranking scores for each scale and enter at the bottom. These totals should then be marked on the attitude profile on the next page.

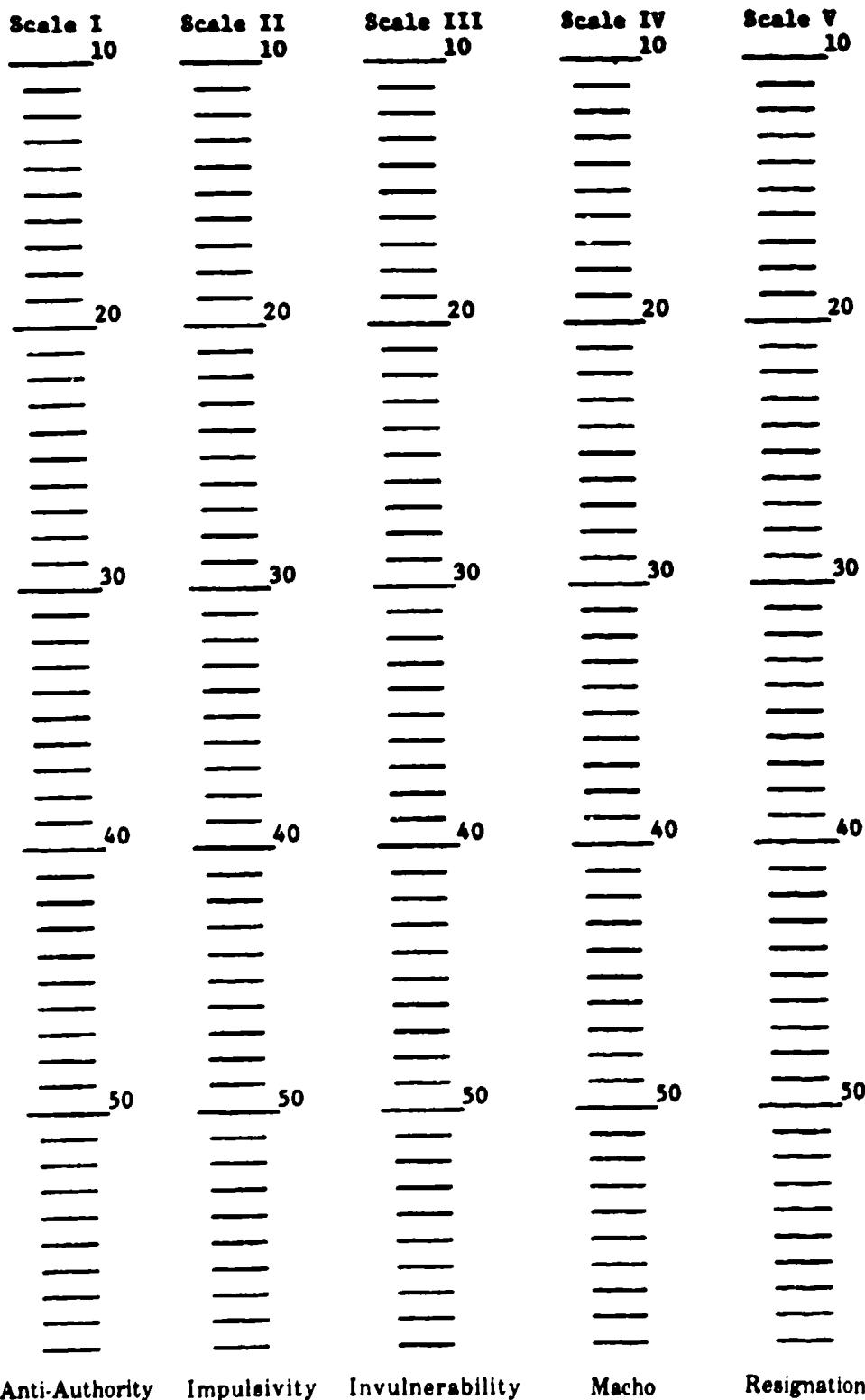
Situation	<u>SCALE I</u>	<u>SCALE II</u>	<u>SCALE III</u>	<u>SCALE IV</u>	<u>SCALE V</u>	Total
1.	a ____	d ____	e ____	b ____	c ____	15
2.	d ____	c ____	b ____	a ____	e ____	15
3.	c ____	b ____	e ____	d ____	a ____	15
4.	b ____	a ____	c ____	d ____	e ____	15
5.	c ____	d ____	b ____	a ____	e ____	15
6.	d ____	a ____	b ____	c ____	e ____	15
7.	d ____	e ____	c ____	a ____	b ____	15
8.	d ____	a ____	e ____	b ____	c ____	15
9.	e ____	d ____	a ____	b ____	c ____	15
10.	b ____	e ____	c ____	a ____	d ____	15
Total	____	____	____	____	____	150

The sum of your scores must be 15 for each situation. If it is not, go back and make sure that you transferred the scores correctly and check your addition. The grand total should be 150.

## ATTITUDE PROFILE

**Total Raw Scores (from Scoring Key):**

Place an "X" on the score that corresponds to your score on each of the scales below. You have completed your Attitude Inventory. The following paragraphs will explain the scales and their significance to your decision making as a helicopter pilot.



## B. PROFILE EXPLANATION

You now have a profile graph which indicates the comparative strength of each of the five hazardous attitudes for you. (Remember, your scores are confidential and need not be divulged to anyone!) The higher the relative rank (first, second, third, etc), the greater is your propensity to respond with that hazardous attitude. Keep your results in mind as you read further. Let us begin the explanation of your profile by describing an all-too-common flight situation.

A pilot of a single-engine helicopter checks the weather and notes that there is a possibility of a thunderstorm at his destination airport. He has never operated an aircraft in bad weather, and he knows that his flight instructor would advise him not to fly. Despite this, he takes off, crashes in poor weather, and seriously injures himself.

Why does this occur so often? Because many accidents involve pilots who allow themselves to be influenced by one or more of the five basic hazardous attitudes. These attitudes get pilots into trouble by causing them to take chances that invite accidents. (The five hazardous attitudes are the ones recorded on the assessment inventory which you have just completed.)

## C. SUMMARY

If you have not already done so, look back at your profile to see which hazardous attitudes most often matched your own thinking when you answered the questions. This shows which patterns you may have a greater tendency to use when your judgment becomes influenced by hazardous attitudes. The inventory does not show that you are bound to act in the manner of one or more of the hazardous attitudes. Having attitudes similar to the ones described as hazardous is common and normal. But as you progress in your flying career, you will find yourself thinking fewer and fewer hazardous thoughts as you become able to identify and counteract them. The important thing to learn is to balance all your thoughts against possible outcomes so that you act only in a non-hazardous manner. A critical part of your decision making training, then, is learning to examine your own thinking and control hazardous attitudes. Regardless of how much you now engage in these thought patterns, often or only rarely, learning to control them will be worthwhile. The less often you allow yourself to act upon a hazardous attitude the safer your flying will become.

When you work on all five hazardous attitudes in the next section, pay particular attention to the ones that may characterize your own particular tendencies. Remember, every pilot probably has had or will have hazardous thoughts to some degree at some time. Problems arise when these types of thoughts occur regularly and/or in the extreme. Learn to recognize them for what they are so that you can deal with them accordingly. (Note: The next section is to be completed as soon as possible after you have finished the self-assessment profile.)

## The Five Hazardous Attitudes

### I. Anti-Authority: "Don't tell me!"

This attitude is found in people who do not like anyone telling them what to do. They think, "Don't tell me!" In a sense, they are saying, "No one can tell me what to do," may either be resentful of having someone tell him or her what to do or may just regard rules, regulations, and procedures as silly or unnecessary. However, it is always your prerogative to question authority if you feel it is in error.

### II. Impulsivity: "Do something--quickly!"

This is the attitude of people who frequently feel the need to do something, anything, immediately. They do not stop to think about what they are about to do; they do not select the best alternative--they do the first thing that comes to mind.

### III. Invulnerability: "It won't happen to me."

Many people feel that accidents happen to others but never to them. They know accidents can happen, and they know that anyone can be affected; but they never really feel or believe that they will be involved. Pilots who think this way are more likely to take chances and run unwise risks, thinking all the time, "It won't happen to me!"

### IV. Macho: "I can do it."

People who are always trying to prove that they are better than anyone else think, "I can do it!" They "prove" themselves by taking risks and by trying to impress others. While this pattern is thought to be a male characteristic, women are equally susceptible.

### V. Resignation: "What's the use?"

People who think, "What's the use?" do not see themselves as making a great deal of difference in what happens to them. When things go well, they think, "That's good luck." When things go badly, they attribute it to bad luck or feel that someone is "out to get them." They leave the action to others--for better or worse. Sometimes, such individuals will even go along with unreasonable requests just to be a "nice guy."

## 5.0 REINFORCEMENT THROUGH REPETITION

This chapter is designed to help you identify and understand the five hazardous attitudes and to see how they can influence your reaction to judgment situations. As you recall, the five hazardous attitudes are:

I. ANTI-AUTHORITY:

"Don't tell me!"

II. IMPULSIVITY:

"Do something--quickly!"

III. INVULNERABILITY:

"It won't happen to me!"

IV. MACHO:

"I can do it."

V. RESIGNATION:

"What's the use?"

Following these instructions you will find another series of situations. At the end of each situation, you will be asked to select an alternative which best illustrates the reactions of a pilot who has a particular hazardous attitude or response pattern. After you select what you feel is the best alternative, look immediately at the next page for the proper response. This page will tell you if your answer is correct or incorrect. If you answered correctly, go on to the next situation. If you answered incorrectly, you will be told why. Then, go back to the situation and select another alternative.

KEEP SELECTING ALTERNATIVES UNTIL YOU SELECT THE CORRECT ONE. Do not be concerned if you select a wrong alternative. You will learn something from the feedback given to you. The lessons are deliberately repetitive, and thus, get easier as you proceed and gain in judgment skills.

### Sample Situation

You arrive at the hospital late, and are immediately dispatched on an inter-hospital patient transfer. You decide to takeoff without cleaning the windshield. On your approach to the rooftop hospital helipad, you are barely able to see the touchdown zone due to the sun's glare on the dirty windshield. Which of the following alternatives best illustrate the "ANTI-AUTHORITY" hazardous attitude.

- a. You feel that it's someone else's job to clean the windshield.
- b. You refuse to clean the windshield because your flight instructor always insisted that you do so.
- c. You just wanted to get going--now!
- d. You feel that your vision is sharp enough to see through the dirty windshield.
- e. You've flown with dirty windshields before without any problems.

Sample Situation Response:

Alternative a:

No! Assigning responsibility for cleaning the windshield to someone else is an example of the hazardous thought "resignation." Go back to the sample situation and select another alternative.

Alternative b:

This is the anti-authority hazardous thought involved in this particular example and the correct response. The pilot obviously resented the authority of the instructor.

Alternative c:

This is the "impulsivity" hazardous thought. Go back and select another alternative.

Alternative d:

This clearly is an example of the macho hazardous thought. Select another alternative.

Alternative e:

No. This is the invulnerability hazardous thought. Just because you got away with it before doesn't mean you can get away with it again. Select another alternative.

A. THE ANTI-AUTHORITY HAZARDOUS ATTITUDE

From the choices following each situation, pick the ONE choice that is the best example of an anti-authority hazardous attitude. Check your answers before continuing. REMEMBER--if you did not choose the correct answer, select another until you choose the correct one.

Situation A1:

You do not conduct a hover check of the twin engine corporate helicopter. On takeoff you notice that the torque meter is not working, but, nevertheless, continue the departure! Your co-pilot feels strongly that you should discontinue the flight and return to the heliport. You then become upset with your co-pilot. Which of the following alternatives best illustrates the ANTI-AUTHORITY reaction?

- a. You tell your co-pilot to "cool it" for butting in.
- b. You start banging the torque meter to get it working.
- c. You think that the hover check is something thought up by bureaucrats just to waste a pilot's time.
- d. You tell the co-pilot that nothing dangerous will happen on the flight.
- e. Your co-pilot continues to become more upset, but you do nothing, because you feel there is no use trying to calm the fellow down.

**Response to Situation A1:**

**Alternative a:**

By acting in a superior way, you are being macho, thinking, "I can do it." Go back to Situation A1 and select another alternative.

**Alternative b:**

By becoming upset and banging the airspeed indicator and by not thinking about the situation, you are being impulsive, thinking "Do something--quickly!" Go back to Situation A1 and select another alternative.

**Alternative c:**

You have identified the anti-authority hazardous attitude involved in this situation. Looking on rules and procedures as just a "waste of time" instead of taking them seriously is an indication of the anti-authority hazardous thought, "Don't tell me." Go on to Situation A2.

**Alternative d:**

Thinking that nothing will happen to you illustrates the hazardous thought of invulnerability, "It won't happen to me." Go back to Situation A1 and select another alternative.

**Alternative e:**

By assuming that what you do has no effect on the co-pilot, the pilot is illustrating the resignation hazardous attitude, "What's the use?" Go back to Situation A1 and select another alternative.

---

A good judgment thought...

---

If you discover the airspeed indicator is not working, abort the takeoff providing you can execute a safe maneuver back to the heliport.

---

**Situation A2:**

You have been cleared for a point-in-space approach at night to a poorly lighted heliport. You are not sure of the prevailing winds at your destination. The surrounding buildings do not look familiar, and it has been over a year since your last visit. A large airport is 15 miles away. Which of the following alternatives illustrates the ANTI-AUTHORITY reaction?

- a. You decide to land anyway, thinking, "Of course I can handle this situation."
- b. Rather than confuse yourself by thinking about options, you decide to land and get the flight over with.
- c. You feel nothing will happen since you have gotten out of similar jams before.
- d. You decide to land since the controller cleared you.
- e. You decide to land because the regulations do not really apply in this situation.

Response to Situation A2:

Alternative a:

Thinking that you can handle the situation even when there is reason to be concerned is an example of the macho hazardous attitude, "I can do it. Go back to Situation A2 and select another alternative.

Alternative b:

This is the hazardous thought of impulsivity: "Do something--quickly!" Go back to Situation A2 and select another alternative.

Alternative c:

Anyone who thinks that nothing will happen to him, even in a problem situation, is illustrating the hazardous attitude of invulnerability, "It won't happen to me." Go back to Situation A2 and select another alternative.

Alternative d:

The belief that "the controller is watching over me" means that the pilot expects the outcome to be decided totally by that controller. He has left himself out of the process. That is the hazardous attitude of resignation, "What's the use?" Go back to Situation A2 and select another alternative.

Alternative e:

Well done--you have identified the anti-authority hazardous attitude involved in this situation. Disregarding regulations or not taking them seriously is the anti-authority thought, "Don't tell me." Go on to Situation A3.

---

A good judgment thought...

---

A night landing at a well lighted airport is much less dangerous than landing at a poorly lit heliport with unknown winds.

---

Situation A3:

You are preparing to take a medical technician on his first "on site" pick-up. You announce that you do not believe it is necessary to wear uncomfortable shoulder harnesses during the enroute portion of a flight. Rather than explaining the regulations and the potential dangers involved you simply take off. Which of the following alternatives best illustrates the ANTI-AUTHORITY reaction?

- a. You know that, as a good pilot, you could handle any emergency long enough to get the shoulder harnesses on.
- b. It's just a local flight on a beautiful day so nothing could go wrong.
- c. You feel that "seat belt" bureaucrats have invented yet another unnecessary regulation.
- d. You feel that if you're going to crash the harnesses won't save you.
- e. You just want to get along.

Response to Situation A3:

Alternative a:

Thinking that you are good enough to handle any situation shows a degree of overconfidence which is associated with the "I can do it" macho hazardous attitude. Go back to Situation A3 and select another alternative.

Alternative b:

Sometimes even local flights result in mishaps. This response suggests a belief that, "It won't happen to me"--the invulnerability hazardous attitude. Go back to Situation A3 and select another alternative.

Alternative c:

Yes! This is the anti-authority hazardous attitude involved in this situation. Most regulations are based on a lot of evidence. In this case overwhelming data indicate that lap belts and shoulder harnesses save lives. Go on to the next hazardous thought.

Alternative d:

No! This kind of response suggests an attitude of resignation--"What's the use?" Go back to Situation A3 and select another alternative.

Alternative e:

No! The unreasoning desire to "just get going" is indicative of the impulsivity hazardous attitude--"Do something quickly." Go back to Situation A3 and select another alternative.

---

A good judgment thought...

---

Life is fragile--buckle up.

---

B. THE IMPULSIVITY HAZARDOUS ATTITUDE

From the five choices following each situation, pick the ONE choice that is the best example of an impulsivity hazardous attitude. Check your answers and keep selecting until you have made the correct choice.

Situation B1:

As you make your practice autorotation to the landing area, you notice a deer in the LZ which requires you to alter your approach path. Distracted, you forgot to check your gas producer to see if the engine is still running. As you begin your flare you find yourself dangerously low with a high sink rate. Glancing at the panel, you realize that your engine has quit. Which of the following alternatives best illustrates the IMPULSIVITY reaction?

- a. You feel that nothing is going to happen because you've made intentional full autorotation landings before.
- b. You laugh and think, "Boy, this full auto will impress people on the ground."

- c. You think that memorizing the checklist is a stupid requirement.
- d. You immediately grab the throttle and attempt a restart.
- e. You think, "It's all up to whether I get an updraft or downdraft now."

Response to Situation B1:

Alternative a:

Feeling that nothing bad can happen suggests the invulnerability hazardous attitude, "It won't happen to me." Go back to Situation B1 and select another alternative.

Alternative b:

When you are thinking about impressing people on the ground, watch out for the macho hazardous attitude, "I can do it"--this can cost you dearly. Go back to Situation B1 and select another alternative.

Alternative c:

Thinking that checklists are stupid suggests that you feel the aircraft designers, the government, and your instructor--all of whom urge the use of checklists--are wrong. This suggests a "Don't tell me" reaction which is the anti-authority hazardous attitude. Go back to Situation B1 and select another alternative.

Alternative d:

Right! Immediately attempting a mid-air restart without thinking is an example of the impulsivity hazardous attitude, "Do something quickly." Unfortunately, in this situation, the engine probably could not "spool up" in time to arrest the sink rate. Go on to Situation B2.

Alternative e:

If you are convinced that it's up to the wind, this implies the hazardous attitude of resignation, "What's the use." Go back to Situation B1 and select another alternative.

---

A good judgment thought...

---

**Distractions can be dangerous--always use your checklist!**

---

Situation B2:

Landing at an unfamiliar airport for fuel, you tell the linemen to "fill it up" and run inside the terminal to make a phone call. Returning, you pay the bill and take off without checking the aircraft, the fuel caps, or the fuel. Which of the following alternatives indicates the IMPULSIVITY reaction?

- a. You feel that it's a silly requirement to preflight an aircraft which you've just flown.
- b. You just want to get underway--quickly.
- c. You know that you have skipped preflights before and nothing bad ever happened.

- d. You have every confidence that a pilot with your skill level could handle in flight anything that might have been overlooked on the ground.
- e. You feel that since you paid top dollar for the fuel, it's the responsibility of the linemen to insure the helicopter was refueled correctly.

**Response to Situation B2:**

**Alternative a:**

Thinking that regulations requiring a preflight inspection are silly suggests a definite anti-authority hazardous attitude. The belief that rules are for other people--a "Don't tell me" attitude--indicates the anti-authority hazardous attitude. Go back to the alternatives.

**Alternative b:**

That's correct. Just wanting to get going indicates the impulsivity hazardous attitude "Do something--quickly." Go on to Situation B3.

**Alternative c:**

Just because you got away with it before does not mean that it is safe. This type of hazardous attitude suggests a feeling of invulnerability, "It won't happen to me." Go back to Situation B2 and select another alternative.

**Alternative d:**

This overconfidence suggests a macho hazardous attitude. Even though you may think, "I can do it," you will soon find this attitude will get you into dangerous situations. Go back to Situation B2 and select another alternative.

**Alternative e:**

Feeling that it is up to somebody else to be responsible is usually associated with dependence on others and suggests the hazardous attitude of resignation--"What's the use?" Go back to Situation B2 and select another alternative.

---

**A good judgment thought...**

---

**It's your responsibility to assure that your aircraft has been properly refueled and is safe for continued flight.**

---

**Situation B3:**

You are returning to your base hospital heliport following a night, onsite accident victim pick-up and transport. You are flying under an overcast and decide to climb up through it. Which of the following alternatives best illustrates the IMPULSIVITY reaction?

- a. You decide to climb because you always thought your instructor was overly cautious when it came to weather.
- b. You figure that since you had several hours of hood time recently, flying in the clouds would be a piece of cake.

- c. You think that you'll be out of these clouds soon because the sky looked clear from the ground. Besides, you have flown through light clouds before in daylight.
- d. You figure that you can always get air traffic control to talk you down.
- e. You just want to immediately pull back on the cyclic to get above the cloud layer.

**Response to Situation B3:**

**Alternative a:**

This attitude of revolting against a practice that your instructor made you adhere to is a definite hazardous attitude resulting from anti-authority feelings--"Don't tell me." Go back to Situation B3 and select another alternative.

**Alternative b:**

This response suggests an "I can do it" attitude, associated with the macho hazardous attitude. Go back to Situation 3 and select another alternative.

**Alternative c:**

The feeling that things will work out is usually associated with the invulnerability hazardous attitude. You falsely believe, "It won't happen to me." Go back to Situation B3 and select another alternative.

**Alternative d:**

This idea that you can always rely on others for help is associated with the resignation hazardous attitude, "What's the use." Go back to Situation B3 and select another alternative.

**Alternative e:**

Correct! The clue here is the word immediately. To act without thinking is the impulsivity hazard attitude--"Do something quickly." This would be very dangerous, especially at night, where spatial disorientation can occur. Go on to the next hazardous attitude section as the directions indicate.

---

A good judgment thought...

---

Temperature and dew point--when they come together, watch out!

---

**C. THE INVULNERABILITY HAZARDOUS ATTITUDE**

From the five choices following each situation, pick the ONE choice that is the best example of an invulnerability hazardous thought pattern. Check your answers and keep selecting until you have made the correct choice.

**Situation C1:**

You are going to fly a routine package delivery after lunch in your light piston helicopter. Your friends are having a drink with their meal. You refuse to drink, but your friends remind you that a single beer won't harm your judgment and that the weather is perfect. They begin to mock you for not drinking with them. Which of the following alternatives best illustrates the INVULNERABILITY reaction?

- a. You decide to drink, thinking that a little liquor will not have any bad effect on you.
- b. You believe that the government is far too rigid in its regulations about drinking.
- c. You resent your friends' insults and start drinking, saying to yourself, "I'll show them."
- d. You bend to their will saying to yourself, "If my time is up, it's up whether I drink or not."
- e. You suddenly decide to take a drink.

**Response to Situation C1:**

**Alternative a:**

Good job--you have identified the hazardous attitude involved in situation C1. A pilot who believes that liquor will not affect him considers himself invulnerable. He thinks, "It won't happen to me." Go on to Situation C2.

**Alternative b:**

Regarding the authority of the government as too rigid is one way of thinking "Those rules are much more strict than they need to be, so I can disregard them." That is the hazardous attitude of anti-authority. Go back to Situation C1 and select another alternative.

**Alternative c:**

The desire to show somebody how great you are, the need to prove yourself represents the macho hazardous attitude, "I can do it." Go back to Situation C1 and select another alternative.

**Alternative d:**

You are thinking what will happen is determined by fate, that you have nothing to do with it. That is the resignation hazardous attitude. Go back to Situation C1 and select another alternative.

**Alternative e:**

The sudden decision to drink, omitting any serious attitude about the situation, is an example of impulsivity: "Do something--quickly!" Go back to Situation C1 and select another alternative.

---

A good judgment thought...

---

If you drink, don't fly.

---

**Situation C2:**

The control tower instructs you to land on the approach end of a runway rather than the heliport you prefer. You see other helicopters using the heliport and wonder why you have been denied permission. Since the tower-recommended approach is on the far side of the airport, you radio the tower and ask for a reconsideration. Which of the following alternatives best illustrates the INVULNERABILITY reaction?

- a. Before you receive a reply, you start making your approach to the unauthorized heliport.
- b. You feel that if other pilots can land their helicopters on the heliport, so can you.
- c. You think that nothing dangerous will occur because you believe the traffic activity is insufficient to present any collision potential.
- d. Regardless what the tower tells you, you are going to do what you want to.
- e. You figure there is no sense in waiting for instructions because the tower is going to do whatever it pleases, regardless of your wishes.

**Response to Situation C2:**

**Alternative a:**

Rushing into action without thinking or waiting for a reply, represents impulsivity. Go back to Situation C2 and select another alternative.

**Alternative b:**

Thinking that you can do anything that they can do is like saying, "I can do it," in an effort to prove yourself. This is a macho response. Go back to Situation C2 and select another alternative.

**Alternative c:**

Yes, this is the invulnerability hazardous attitude. The tower is concerned about wake turbulence. The fact that you are not and that you feel there is nothing to worry about is a sign of the hazardous attitude of invulnerability. Go on to Situation C3.

**Alternative d:**

This is an anti-authority response: "I'll do what I want to do, regardless of what the authority says." Go back to Situation C2 and select another alternative.

**Alternative e:**

Believing that nothing you do will make any difference is resignation. "What's the use?" Go back to Situation C2 and select another alternative.

---

A good judgment thought...

There are many reasons why controllers might want you to land on a particular spot--always feel free to inquire, but then follow their instructions explicitly.

---

**Situation C3:**

Because of strong headwinds on a powerline patrol flight, you land at a small airport to refuel only to learn they have no fuel. A local instructor suggests you backtrack 40 miles to an airport that has fuel. Which of the following alternatives best illustrates the INVULNERABILITY reaction?

- a. You ignore this unsolicited advice. You feel flight instructors are always complicating matters.
- b. You feel sure you can make it to the next heliport where you know there is fuel and because things always seem to work out well for you!
- c. You continue your flight because the chief pilot approved your flight plan.
- d. Rather than taking the time to calculate your fuel requirements and analyze your alternatives, you hop in the helicopter and go.
- e. You decide to go on, thinking how impressed the chief pilot will be when he hears you beat the headwinds without refueling.

**Response to Situation C3:**

**Alternative a:**

The pilot who has no respect for authority figures (such as flight instructors) and disregards their advice, thinking they are always complicating plans, illustrates the hazardous attitude of anti-authority, "Don't tell me." Go back to Situation C3 and select another alternative.

**Alternative b:**

Yes! Thinking things will always work out is the invulnerability hazardous attitude. "It won't happen to me." Go on to the next hazardous thought section.

**Alternative c:**

Feeling that enroute decisions are always the responsibility of others (such as the chief pilot) suggests the resignation hazardous attitude, "What's the use?" Go back to Situation C3 and select another alternative.

**Alternative d:**

No! Making hasty decisions without examining the alternatives suggests the impulsivity hazardous attitude, "Do something--quickly." Go back to Situation C3 and select another alternative.

**Alternative e:**

This is the "I can do it" attitude associated with the macho hazardous attitude. Go back to Situation C3 and select another alternative.

---

A good judgment thought...

---

Often when flying, situations occur that require a change of plans. Be flexible!

---

#### D. THE MACHO HAZARDOUS ATTITUDE

From the five choices following each situation, pick the ONE choice that is the best example of a macho hazardous attitude. Check your answers and keep selecting until you have made the correct choice.

##### Situation D1:

Visibility at your rooftop hospital heliport is just over three miles in blowing snow with a 1,100 foot ceiling. Earlier you had cleared the helicopter of snow, but stabilizing the patient had delayed you by fifteen minutes. More snow is accumulating and you wonder if you will be able to takeoff. Which of the following alternatives best illustrates the MACHO reaction?

- a. You feel that there is no use getting out to clear the snow off since it is only going to pile up again.
- b. You believe that you can take off in these conditions and think of how impressed your fellow pilots will be when they hear of it.
- c. You take off immediately, thinking that any further delay will only worsen the problem.
- d. You reason that you can do it because the other pilots have done so and nothing happened to them.
- e. You resent being delayed and decide you are not going to clear the snow off again for anybody.

##### Response to Situation D1:

###### Alternative a:

When a pilot does not see himself as affecting what happens, he is illustrating the hazardous thought of resignation. He thinks, "What's the use?" Go back to Situation D1 and select another alternative.

###### Alternative b:

Absolutely! You want to prove yourself, to show off, to have others think that you are great. This is the macho hazardous attitude: "I can do it." Go on to Situation D2.

###### Alternative c:

You take off immediately. No thinking; no planning; no looking ahead. Action without thought illustrates impulsivity. Go back to Situation D1 and select another alternative.

###### Alternative d:

When you think, "Nothing happened to them," you are really saying, "It won't happen to me.." That is the hazardous attitude of invulnerability. Go back to Situation D1 and select another alternative.

###### Alternative e:

Pilots who resent using appropriate safety procedures because they are

prescribed by some authority are illustrating the anti-authority hazardous attitude, "Don't tell me." Go back to Situation D1 and select another alternative.

---

A good judgment thought...

Any frost, snow or ice on the helicopter at takeoff adversely affects performance.

---

Situation D2:

The weather forecast calls for freezing rain. Enroute you notice ice accumulating on the windshield. You are not sure what to do because you have never encountered this problem before. Because the helicopter is still flying well, you are tempted to do nothing. A passenger suggests you might radio for information. Which of the following alternatives best illustrates the MACHO reaction?

- a. You feel that there probably will not be any problem since you have always come out of difficult situations rather well.
- b. You feel that there is nothing you can really do because radio information won't change the weather conditions.
- c. You quickly tell the passenger to stop butting in.
- d. You tell the passenger that you are the boss and will handle the problem your way.
- e. You radio for information but decide to ignore the advice since the helicopter continues to fly well.

Response to Situation D2:

Alternative a:

When you think that since nothing has ever happened before, nothing will happen in the future, you are thinking, "It won't happen to me," which is the hazardous attitude of invulnerability. Go back to Situation D2 and select another alternative.

Alternative b:

Thinking, "What's the use?" is illustrating the resignation hazardous attitude. Go back to Situation D2 and select another alternative.

Alternative c:

Acting without thinking is impulsivity. "Do something--quickly!" Go back to Situation D2 and select another alternative.

Alternative d:

This is the macho hazardous attitude involved. This tendency to say, "We'll do it my way," is a good indication of the macho hazardous attitude, "I can do it." Go on to Situation D3.

Alternative e:

Those who ignore information or advice certainly do not take authority seriously. They are determined to do what they want to do. This illustrates the anti-authority hazardous attitude of "Don't tell me." Go back to Situation D2 and select another alternative.

---

A good judgment thought...

Freezing rain or drizzle is one of the worst icing hazards and can build up rapidly within minutes.

---

Situation D3:

The ski resort helipad is at 9000 feet located in a clearing surrounded by high trees. You are asked to take an additional passenger, who will overload the helicopter by about 70 pounds. The extra passenger is waiting for your reply. Which of the following alternatives best illustrates the MACHO reaction?

- a. You take the passenger, reasoning that if fate says you are going to crash, you will, with or without extra weight.
- b. You take the passenger, fearing that you will lose respect if you do not.
- c. You take the passenger, remarking to yourself that the weight and balance rules are unnecessarily strict.
- d. Since the passenger seems friendly, you take him on board right away and do not give another thought to it.
- e. You take the passenger, thinking that accidents only happen to others.

Response to Situation D3:

Alternative a:

Trusting in luck is the same as assuming that whatever happens will happen, in spite of anything you might do to change it. This is illustrating the hazardous attitude of resignation: "What's the use?" Go back to Situation D3 and select another alternative.

Alternative b:

Yes! Once again, you have selected the macho hazardous attitude, "I can do it." The pilot who is more concerned about what others think of him than he is about safety. Go on to the next hazardous attitude section.

Alternative c:

This is anti-authority: You are not taking the weight limits seriously, disregarding them, thinking, "Don't tell me." Go back to Situation D3 and select another alternative.

**Alternative d:**

Making an immediate decision without any thought of its consequences or any consideration of alternatives illustrates impulsivity--the hazardous attitude "Do something--quickly!" Go back to Situation D3 and select another alternative.

**Alternative e:**

When you think that accidents happen only to other people you believe you are invulnerable. The pilot in this situation is thinking, "It won't happen to me." Go back to Situation D3 and select another alternative.

---

A good judgment thought...

Don't be pressured by anyone into overloading a helicopter for any reason.

---

**E. THE RESIGNATION HAZARDOUS ATTITUDE**

From the five choices following each situation, pick the choice that is the best example of the resignation hazardous attitude. Check your answers and keep selecting until you have made the correct choice. Then move on to the next situation.

**Situation E1:**

The company's CEO would like to arrive early for an important business meeting. If you stick to your flight plan, you will just about make it, assuming there are no problems. Or, you can take a route over the mountains, which will get you there much earlier. If you choose the route through the mountain passes, it means you might encounter low hanging clouds while good weather prevails over the planned route according to the weather briefer. Which of the following alternatives best illustrate the RESIGNATION reaction?

- a. You take the mountain route even though the weather briefer has advised against it.
- b. You take the mountain route, thinking that a few clouds in the passes will not cause any trouble for this flight.
- c. You feel it will be an important achievement for you if you take the mountain route and arrive early.
- d. You tell yourself that there is no sense sticking to the planned route because, "There's nothing else that can be done in order to make it early."
- e. You quickly choose the mountain route, deciding that you just must keep the boss happy.

**Response to Situation E1:**

**Alternative a:**

Not accepting the advice of the weather briefer is an example of the

hazardous attitude of anti-authority. Rules do not apply to me: "Don't tell me." Go back to Situation E1 and select another alternative.

Alternative b:

This illustrates the hazardous attitude of invulnerability: "It won't happen to me." Go back to Situation E1 and select another alternative.

Alternative c:

Vying for personal achievement means you are trying to prove you are better than others, making the situation a personal challenge rather than a problem to be solved with care. This illustrates the macho hazardous attitude, "I can do it." Go back to Situation E1 and select another alternative.

Alternative d:

Yes! Well done--you have identified the resignation hazardous attitude. Thinking that there is nothing you can do or "What's the use?" Go on to Situation E2.

Alternative e:

A quick decision, without careful thought or consideration of the consequences, illustrates impulsivity: "Do something--quickly!" Go back to Situation E1 and select another alternative.

---

A good judgment thought...

---

Flying through mountain passes with low hanging clouds can ruin your whole day!

---

Situation E2:

The weather briefer advises you of possible hazardous weather conditions at the oil rig. Enroute you encounter heavy rainshowers and increasingly poor visibility. Although you have plenty of fuel to return to your departure point on shore, you have a hunch that the weather will improve before you reach your destination. Which of the following alternatives best illustrate the RESIGNATION reaction?

- a. You feel there is no need to worry about the weather since there is nothing one can do about it.
- b. You immediately decide to continue, and block the weather conditions out of your mind.
- c. You feel nothing will happen to you since you have plenty of fuel.
- d. You think that the weather people are always complicating your flights, and sometimes, such as now, it is best to ignore them.
- e. You fly on, determined to prove that your own weather judgment is sound.

Response to Situation E2:

Alternative a:

Yes, this is the resignation hazardous attitude. If you decide that there is nothing that you can do about the situation, this is the hazardous thought of resignation. People who think this way say to themselves, "What's the use?" Go on to Situation E3.

Alternative b:

When you block immediate thoughts from your mind and decide to go on without considering the consequences, your thinking is, "Do something--quickly!" and this is impulsivity. Go back to Situation E2 and select another alternative.

Alternative c:

Having plenty of fuel does not mean that something will not happen to you. This illustrates the hazardous attitude of invulnerability, "It won't happen to me." Go back to Situation E2 and select another alternative.

Alternative d:

Having no respect for authority (weather forecasters) and disregarding their advice illustrates the hazardous attitude of anti-authority: "Don't tell me." Go back to Situation E2 and select another alternative.

Alternative e:

When a pilot tries to show how good he is, instead of taking careful action, he is being macho and thinking, "I can do it." Go back to Situation E2 and select another alternative.

---

A good judgment thought...

---

Use all your resources, both your eyes and your radio, to determine what weather lies ahead.

---

Situation E3:

Approaching the hastily prepared LZ at the scene of a highway accident at night, you fly into patches of ground fog which severely limit visibility. Your altitude is 150 feet, and you debate whether you should continue the approach and land or abort the mission. Which of the following alternatives best illustrate the RESIGNATION reaction?

- a. You think the rules which indicate you should abort the mission are much too rigid.
- b. You feel that the situation presents a challenge and that you are going to make the landing.
- c. You immediately decide to continue the approach saying, "To heck with the fog."
- d. You continue, feeling that the decision has already been made.

e. You say to yourself, "I'm going in because nothing is going to happen."

Response to Situation E3:

Alternative a:

By regarding the rules as too rigid, you are acting on the anti-authority hazardous attitude, "Don't tell me." Go back to Situation E3 and select another alternative.

Alternative b:

Seeing a situation as a challenge, as a chance to prove oneself instead of as a problem to be solved is an illustration of the macho hazardous attitude, "I can do it." Go back to Situation E3 and select another alternative.

Alternative c:

A quick decision without thinking through the alternatives or consequences illustrates the hazardous attitude, "Do something--quickly!"--an example of a pilot who is impulsive. Go back to Situation E3 and select another alternative.

Alternative d:

Nice job--you have identified the resignation hazardous attitude. When you believe that a decision has already been made, that you can do nothing more about it is an example of thinking: "What's the use?"--the hazardous attitude of resignation. Go on to the next chapter.

Alternative e:

The belief that "nothing is going to happen" is the hazardous attitude of invulnerability. Go back to Situation E3 and select another alternative.

---

A good judgment thought...

---

Fog can lead to spatial disorientation, especially at night.

---

## 6.0 ANTIDOTES FOR HAZARDOUS ATTITUDES

Now you know the five major hazardous attitudes which contribute to poor pilot judgment. Because you worked extensively with these attitudes in the previous chapters, you are already more aware of, and alert to, them in your own thinking. This is an important first step in eliminating them from your judgments. This next chapter is designed to teach you a way to counteract hazardous attitudes so that they do not adversely affect your actions.

Since you cannot think about two things at once, one way to keep from thinking about a hazardous attitude is to think about another attitude. By telling yourself something different from the hazardous attitude, you're taking an antidote to counteract the hazardous attitude. You remove a hazardous attitude by substituting the antidote. Thus, if you discover yourself thinking, "It won't happen to me," mentally tell yourself, "That is a hazardous attitude." Recognize a hazardous attitude, correctly label the thought, and then say its antidote to yourself.

To do this, you must **MEMORIZE THE ANTIDOTES** for each of the hazardous attitudes. Know them so well that they will automatically come to mind when you need them.

### THE FIVE ANTIDOTES

Hazardous Attitude	Antidote
<b>ANTI-AUTHORITY:</b> "Don't tell me."	"Follow the rules. They are usually right."
<b>IMPULSIVITY:</b> "Do something--quickly."	"Not so fast. Think first."
<b>INVULNERABILITY:</b> "It won't happen to me."	"It <u>could</u> happen to me."
<b>MACHO:</b> "I can do it."	"Taking chances is foolish."
<b>RESIGNATION:</b> "What's the use?"	"I'm not helpless. I can make a difference."

#### A. EXERCISE 1--ANTIDOTE RECALL

You must not continue this lesson until you have learned the antidotes thoroughly. Practice them now. Without referring to the text, write the antidote to each hazardous attitude below. Check your statements and, if you are correct, continue. If not, study the antidotes until you can write them word for word from memory.

## Hazardous Thought

## Antidote

## ANTI-AUTHORITY:

### **IMPULSIVITY:**

## INVULNERABILITY:

## MACHO:

**RESIGNATION:**

## B. EXERCISE 2--ANTIDOTE IDENTIFICATION

Each of the following situations contains a description of what is happening in a flight situation and what the pilot is thinking. Correctly apply the hazardous attitude antidotes.

**Instructions:**

### Situation 1

On her third solo flight, a student pilot decides to take a friend for a helicopter ride. In the air the pilot thinks, "It's great to be up here without an instructor criticizing everything I do. His do-it-by-the-book attitude takes all the fun out of flying."

As the pilot nears her friend's farm, she remembers that it is about eight miles from the closest airport. The pilot thinks, "I'll land in the pasture behind the barn at my friend's farm. It won't be dangerous at all...the pasture is fenced and mowed and no animals are in the way. There's more than enough room, just like a heliport. I'll just tell Joan not to tell anyone I did it so I won't get into trouble with anyone who knows it's against the rules."

"No one other than Joan's family lives anywhere near there, but if anyone happens to check on me, I'll just tell them it was an emergency landing. OK. I'll do it. The plan is foolproof."

The student pilot makes a hard landing in the pasture and nearly hits the fence with the tail rotor before she gets the helicopter stopped. However, she is very proud of herself and she thinks, "Way to go, Ace! You're a natural for being a great pilot."

The pilot secures the helicopter and starts walking towards her friend's house as a sheriff's car drives up. Surprised that anyone observed her landing, she starts cursing this unpleasant turn of events. "I just know this cop is going to foul up my whole day. Why don't they stick to catching robbers and murderers, and leave people like me alone to have some harmless fun? If it weren't for my bad luck, this cop wouldn't have come along and this would have been a great afternoon."

### Antidote

#### Example:

##### ANTI-AUTHORITY

"Follow the rules:  
They are usually right."

Do not proceed with situation 2 until you have reviewed the answer key to this situation.

### Key to Situation 1

Compare your response to situation 1 with those given below. Remember, your responses may not be identical to those in this key. Still, you should have identified most of the hazardous thoughts indicated.

On her third solo flight, a student pilot decides to take a (1) friend for a helicopter ride. In the air the pilot thinks, "It's great to be up here without an instructor criticizing everything I do. His do-it-by-the-book attitude takes all the fun out of flying."

As the pilot nears her friend's farm, she remembers that it is (2) about eight miles from the closest airport. The pilot thinks, "I'll land in the pasture behind the barn at my friend's farm. It won't be dangerous at all...the pasture is fenced and mowed and no animals are in the way. There's more than enough room, just like a heliport. I'll just tell Joan not to tell anyone I did it so I won't get into trouble with anyone who knows it's against the rules."

"No one other than Joan's family lives anywhere near there, but if anyone happens to check on me, I'll just tell them it was an (3) emergency landing. OK. I'll do it. The plan is foolproof."

The student pilot makes a hard landing in the pasture and nearly hits the fence with the tail rotor before she gets the helicopter (4) stopped. However, she is very proud of herself and she thinks, "Way to go, Ace! You're a natural for being a great pilot."

The pilot secures the helicopter and starts walking towards her friend's house as a sheriff's car drives up. Surprised that anyone observed her landing, she starts cursing this unpleasant turn of events. "I just know this cop is going to foul up my whole day. Why don't they stick to catching robbers and murderers, and leave people (5) like me alone to have some harmless fun? If it weren't for my bad luck, this cop wouldn't have come along and this would have been a great afternoon."

- (1) Anti-Authority  
"Follow the rules: They are usually right."
- (2) Impulsivity:  
"Not so fast. Think first."
- (3) Invulnerability:  
"It could happen to me."
- (4) Macho:  
"Taking chances is foolish."
- (5) Resignation:  
"I'm not helpless. I can make a difference."

After you have compared your responses with those above, go on to Situation 2.

## Situation 2

Tom and George are flying in the company's single engine helicopter, and they decide to "buzz" some friends who are swimming in a nearby lake. Tom is an experienced pilot who has done buzzing many times before. In fact, he often brags that someday he will be the chief pilot, and then everybody can see his talents on display.

George likes Tom and likes to go along on "buzzing" runs. However, George is a low-time pilot, and he sometimes wonders if Tom is not pushing his luck. George is not worried about an accident, however, because he is convinced that Tom is a great pilot who can handle anything that might happen.

As they are buzzing the lake, both are interested in watching for the reactions of their friends on the ground. Tom descends lower than usual on the third pass. When he tries to climb out, the helicopter does not quite make it over a power transmission line. The tailboom brushes the power line, sparks fly, and the tail rotor sustains minor damage. George panics and yells, "We're going to crash, we're going to crash!"

Tom is also shaken, but he maintains control of the helicopter and tells George, "Calm down and help me fly this thing back, or we're going to be in big trouble over this. I told you I could handle anything in this helicopter."

As they head for the company heliport, the helicopter continues to fly without difficulty. They have a good laugh over the incident, telling one another that it is another great adventure in their flying careers. Tom tells George, "You know, if the power company had any sense, they would bury all those power lines. If they would do that, pilots like us would have an easier time of flying safely."

## Antidote

Check your answers to this situation with the key.

## Key to Situation 2

Tom and George are flying in the company's single engine helicopter, and they decide to "buzz" some friends who are swimming in a nearby lake. Tom is an experienced pilot who has done buzzing many times

(1) before. In fact, he often brags that someday he will be the chief pilot, and then everybody can see his talents on display.

George likes Tom and likes to go along on "buzzing" runs. However, George is a low-time pilot, and he sometimes wonders if Tom is not pushing his luck. George is not worried about an accident, however,

(2) because he is convinced that Tom is a great pilot who can handle anything that might happen.

As they are buzzing the lake, both are interested in watching for the reactions of their friends on the ground. Tom descends lower than usual on the third pass. When he tries to climb out, the helicopter does not make it over a power transmission line. The tailboom brushes the power line, sparks fly, and the tail rotor sustains minor

(3) damage. George panics and yells, "We're going to crash, we're going to crash!"

(4) Tom is also shaken, but he maintains control of the helicopter and tells George, "Calm down and help me fly this thing back, or we're going to be in big trouble over this. I told you I could handle anything in this helicopter."

As they head for the company heliport, the helicopter continues to fly without difficulty. They have a good laugh over the incident,

(5) telling one another that it is another great adventure in their flying careers. Tom tells George, "You know, if the power company

(6) had any sense, they would bury all those power lines. If they would do that, pilots like us would have an easier time of flying safely."

(1) Macho:  
"Taking chances is foolish."

(2) Invulnerability:  
"It could happen to me."

(3) Impulsivity:  
"Not so fast. Think first."

(4) Macho:  
"Taking chances is foolish."

(5) Invulnerability:  
"It could happen to me."

(6) Resignation:  
"I'm not helpless. I can make a difference."

Now, go on to Situation 3.

### Situation 3

At the end of a long solo ferry flight, Bill discovers the company heliport lights are not on. He thinks, "I didn't think about the possibility that everyone might have gone home. I should have telephoned ahead." Then he becomes angry with the company management, thinking, "They could have left the lights on at night for me. Who are they to control how late I can land? The next time I see the boss I will tell him a thing or two about how to run a helicopter operation."

Determined to land, Bill declares, "I'm landing here tonight, lights or no lights. I'll just have to rely on myself and show these guys how a top-notch pilot can do whatever needs doing." Bill looks around for the lighted flag in front of the office to indicate wind direction and chooses a heading for landing. Unsure of his height above the heliport, he flares too quickly and comes to a hover out of ground effect above the heliport. He immediately reduces power rather than going around to set up his landing again.

After landing hard, the helicopter bounces onto one skid. In order to compensate Bill picks the helicopter up into a hover and loses directional control. He hits the side of the hangar with the tail rotor. Bill is unhurt, but the helicopter is substantially damaged. To himself, Bill says, "If the lights were on, this would not have happened."

A few minutes later the security people arrive to see what has happened. Bill starts telling them how the accident is the fault of the boss. Someone asks Bill why he decided to land without heliport lights. He answers, "Look, I'm an experienced pilot. Having no lights is not a serious problem. There should be more rules about how to run this company and less about how a guy like me is supposed to fly his helicopter."

### Antidote

Check your answers to this situation with the key.

### Key to Situation 3

On a night landing, Bill discovers the company heliport lights are not on. He thinks, "I didn't think about the possibility that everyone might have gone home. I should have telephoned ahead."

(1) Then he becomes angry with the company management, thinking, "They could have left the lights on at night for me. Who are they to control how late I can land? The next time I see the boss I will tell him a thing or two about how to run a helicopter operation."

Determined to land, Bill declares, "I'm landing here tonight, lights (2) or no lights. I'll just have to rely on myself and show these guys how a top-notch pilot can do whatever needs doing." Bill looks around for the lighted flag in front of the office to indicate wind direction and chooses a heading for landing. Unsure of his height above the heliport, he flares too quickly and comes to a hover out of (3) ground effect above the heliport. He immediately reduces power rather than going around to set up his landing again.

After landing hard, the helicopter bounces onto one skid. In order to compensate Bill picks the helicopter up into a hover and loses directional control. He hits the side of the hangar with the tail rotor. Bill is unhurt, but the helicopter is substantially damaged.

(4) To himself, Bill says, "If the lights were on, this would not have happened."

A few minutes later the security people arrive to see what has (5) happened. Bill starts telling them how the accident is the fault of the boss. Someone asks Bill why he decided to land without heliport (6) lights. He answers, "Look, I'm an experienced pilot. Having no (7) lights is not a serious problem. There should be more rules about how to run this company and less about how a guy like me is supposed to fly his helicopter."

(1) Anti-Authority:  
"Follow the rules: They are usually right."

(2) Macho:  
"Taking chances is foolish."

(3) Impulsivity:  
"Not so fast. Think first."

(4) Resignation:  
"I'm not helpless. I can make a difference."

(5) Resignation:  
"I'm not helpless. I can make a difference."

(6) Macho:  
"Taking chances is foolish."

(7) Anti-Authority:  
"Follow the rules: They are usually right."

DID YOU GET ALL ANSWERS CORRECT? GOOD! YOU HAVE FINISHED THIS EXERCISE. GO ON TO EXERCISE 3.

### C. EXERCISE 3: RECOGNIZING AND REPLACING HAZARDOUS ATTITUDES

You have now learned the meaning of the five hazardous thoughts and the antidotes to substitute for them. But, for judgment training to benefit you, the mental process of recognizing a hazardous attitude, substituting the correct antidote, and then applying good judgment attitudes must become automatic.

In this exercise, you will practice recognizing potential hazardous attitudes in various flight situations, recalling the correct antidote, and thinking of good pilot judgment for the same situation.

#### Instructions:

1. Read each situation and the description of the pilot's thinking.
2. In the blanks beneath each situation, fill in the hazardous attitude, the antidote, and a brief description of good pilot judgment for the same situation. (You do not need to write complete sentences.)
3. Ask your flight instructor to review your answers when you have completed the first five situations.

#### EXAMPLE

##### Situation:

The pilot and his non-pilot employer have just landed at a heliport to pick up an important package. The throttle has been reduced to flight idle and they are waiting for the attendant to bring the package out to them. After a while, the pilot gets out to go look for him leaving his boss at the controls.

##### Pilot's Thinking:

No sense delaying anymore. I'll just tighten the friction on the controls and go find the attendant myself - I certainly can't ask the boss to go. Besides, he's pretty good with machinery, he can hold the controls until I get back.

##### Hazardous Thought:

Invulnerability

##### Antidote:

It could happen to me.

##### Good Judgment:

Pilot shuts down engine and accepts resulting delay while looking for the missing attendant.

## Situations 1-5

### Situation 1:

The helicopter pilot did not allow for strong headwinds when calculating fuel consumption. With 45 minutes of fuel left, she can land at an alternate airport just below or continue to the destination which she thinks is only 30 minutes away.

#### Pilot's Thinking:

I will fly on to my destination. I can be there in 30 minutes. I can make it if I just keep going.

#### Hazardous Attitude:

#### Antidote:

#### Good Judgment:

### Situation 2:

The helicopter pilot is preparing to lift into a hover when he feels a sharp pain in his chest. He thinks it might be indigestion but is undecided if he should mention anything to his passengers or possibly delay takeoff.

#### Pilot's Thinking:

There is nothing I can say to the passengers that would help. I will continue the flight. It is just my rotten luck that I had bad food for lunch.

#### Hazardous Attitude:

#### Antidote:

#### Good Judgment:

**Situation 3:**

The pilot is on a "Heli-skiing" flight with three skiers on board heading for some nearby slopes. Weather conditions for the area include snow showers and gusty winds.

**Pilot's Thinking:**

I am sure I'll be able to land without permission at that private heliport near the ski lodge if the weather gets too bad.

**Hazardous Attitude:**

**Antidote:**

**Good Judgment:**

**Situation 4:**

A VIP passenger appears to be suffering from a sudden illness, and still there are 60 minutes to the intended destination. The passenger says he is all right, but his wife is very concerned that he may need medical aid. The nearest heliport is unmanned, and it is 35 miles from a hospital.

**Pilot's Thinking:**

This man is sick, and his wife is really upset. I can't deal with this in the air. I better get this thing down--fast. Landing at the nearest heliport probably is a good idea.

**Hazardous Attitude:**

**Antidote:**

**Good Judgment:**

**Situation 5:**

It is after dark, and the pilot arrives at the airport after having a few beers at a picnic. Some friends he has not seen for many years ask him to take them for a ride along the lake front. Weather is officially reported as clear at the airport, but fog has begun to form over the lake 10 miles away.

**Pilot's Thinking:**

The beers I had this afternoon certainly will not affect my flying skills now. Besides, the weather looks good, and my friends will be impressed when I fly them over the lake at night.

**Hazardous Attitude:**

**Antidote:**

**Good Judgment:**

ASK YOUR FLIGHT INSTRUCTOR TO REVIEW WITH YOUR YOUR ANSWERS TO THE FIRST FIVE SITUATIONS. IF YOU HAVE DONE WELL, MOVE ON TO THE NEXT SECTION. IF YOU NEED MORE PRACTICE WITH THE ANTIDOTES, YOU MAY BE ASSIGNED TO DO SITUATIONS 6 THROUGH 10. (If so, be sure to discuss your answers for situations 6-10 with your instructor.)

NOTE: DO NOT BECOME DISCOURAGED WITH DOING EXERCISES THAT SEEM REPETITIVE. JUST AS REPEATED TOUCH-AND-GO LANDINGS TEACH YOU GOOD LANDING TECHNIQUES, THESE EXERCISES TEACH YOU THE CORRECT DECISION MAKING PROCESS BY HELPING YOU FORM NEW HABITS.

## Situations 6-10

### **Situation 6:**

The pipeline patrol pilot checks twice by phone for weather in the area of his proposed VFR trip. On both occasions he receives warnings of severe or extreme turbulence. He takes off as planned, despite suggestions from experienced pilots that such a flight is very risky.

#### **Pilot's Thinking:**

I have to get the job done by 10 o'clock. It can't be that bad, and I've handled weather like this before without an accident. Nothing will happen to me.

#### **Hazardous Attitude:**

#### **Antidote:**

#### **Good Judgment:**

### **Situation 7:**

The helicopter pilot is assigned to do some night flying. He calls up two company executives and tells them that he will pick them up at 8:00 p.m., but he does not check the weather. When he gets to the heliport the ceiling is 300 feet with three miles visibility.

#### **Pilot's Thinking:**

I can't let those guys think that I'm afraid of a few little clouds. I'd never hear the end of it. Anyway, I promised them we would go, and I know I can handle this helicopter even when the going gets rough.

#### **Hazardous Attitude:**

#### **Antidote:**

#### **Good Judgment:**

**Situation 8:**

A twin turbine helicopter is following a light piston powered helicopter on final at a downtown heliport. The second helicopter is quickly overtaking the trainer. The trainer does a "stop-and-go" as the second helicopter makes a go-around directly over the heliport. On climb-out, both helicopters nearly collide.

**Pilot's Thinking:**

The pilot of the second helicopter thinks the requirement to deviate to the right when overtaking another helicopter is a silly rule.

**Hazardous Attitude:**

**Antidote:**

**Good Judgment:**

**Situation 9:**

A helicopter pilot is on a chartered wildlife photography flight. He flies low over a swamp to look for alligators. Flying at 50 feet, the pilot thinks he sees birds taking off in front of the aircraft. The pilot pulls back hard on the cyclic and starts a climbing turn but gets into a fast rate of descent and crashes into trees.

**Pilot's Thinking:**

Those birds might come right through the windshield! I'd better not take any chances, I'll do a zoom-climb and turn and get away from them as fast as I can.

**Hazardous Attitude:**

**Antidote:**

**Good Judgment:**

**Situation 10:**

The student rotorcraft pilot takes off in good weather for a local training flight. Upon return two hours later she finds the airport in the midst of local heavy rain. The pilot is low on fuel because she stayed in the practice area longer than she intended.

**Pilot's Thinking:**

Gee, my practice went so well. What rotten luck to be low on gas now. I guess I'll just keep flying around out here and hope the airport goes back to VFR so I can land.

**Hazardous Attitude:**

**Antidote:**

**Good Judgment:**

## 7.0 IDENTIFYING AND REDUCING STRESS

You may ask yourself, "What does stress management have to do with decision making?" Stress is one of the greatest factors affecting our ability to make logical decisions. It causes us to have "tunnel vision," or a narrow focus. We do not see all of the information in front of us and we have difficulty making choices from among alternatives. In its most insidious form it is called panic during which we may even lose control of our motor coordination.

The second reason for this chapter is that decision making or rather the lack thereof, is one of the leading causes of stress. The simple commitment to make a flight, whether self-imposed or forced on us by others, can cause a great deal of mental stress that can lead to all of the problems mentioned above. Such pressure is one of the leading causes of workload in the cockpit and can cause us to fail to allocate the necessary attention to the task of flying the airplane.

The growing interest in stress reflects the widespread awareness that stress is related to many physical and mental disorders, and to a large number of accidents in homes, industry, and aircraft. In this section, we examine stress as it affects our lives, in general, and our flying performance, in particular. Simply recognizing the involvement of stress does not necessarily solve the problem. We must try to understand how to cope with it. Suggestions are made to enable us to deal with stress more effectively.

### What is Stress?

Stress is the term we use to describe the body's nonspecific response to demands placed upon it, whether these demands are pleasant or unpleasant. The demands for you could be an unexpected windshear encountered on landing, a higher than expected headwind forcing you to consider a different destination for your flight, losing your wallet, or cutting your finger. Our bodies will respond to these and all other demands in three stages: First, there will be an alarm reaction; then resistance; and finally, exhaustion (if the demand continues). This three-stage response is part of our primitive biological coping mechanism which would have prepared our ancestors for fight or flight.

Alarm reaction. In the alarm stage, the body recognizes the stressor and prepares for fight or flight by activating a part of the brain which stimulates the pituitary gland to release hormones. These hormones trigger the adrenal glands to pour out adrenaline. Adrenaline increases heartbeat and rate of breathing, raises blood sugar level, increases perspiration, dilates the pupils, and slows digestion. If the alarm results in fear, the body reacts with low blood pressure resulting in a pale face. The process results in a huge burst of energy, greater muscular strength, and better hearing and vision. You may recall experiencing such an alarm reaction the first time you tried to hover over a spot, for example. You may recall the effects of your body's alarm reaction.

The body's reaction to anger, however, is quite different. Contrary to the alarm reaction to fear, the anger reaction results in the secretion of non-adrenaline which results in a physiological reaction of high blood pressure as can be seen in the red face. In some ways the stress on the body caused by anger is much more dangerous than that produced by fear.

In the short term solution to the immediate problem, the production of adrenaline causes a greater level of alertness (to a certain point) which permits a greater capability to find a solution. The long term results are not harmful unless they are very severe and lasting. On the other hand, the effects of anger, secretion of non-adrenaline, cause high blood pressure which in the short term does not assist the development of a solution to an immediate problem and in the long term can be very dangerous to one's health. These two types of stress should be kept in mind while studying this chapter. In particular, anger needs to be avoided in flying situations.

Resistance. In the resistance stage, the body repairs any damage caused by the stress and may adapt to some stresses such as extreme cold, hard physical labor, or worries. Fortunately, most physical and emotional stressors are of brief duration and our bodies cope with the physiological demands of the stress. During our lifetime, we go through the first two stages many times. We need these response mechanisms to react to the many demands and threats of daily living.

However, if the stress continues (for example, if you were caught in or above clouds flying VFR or realize that you may not reach your destination because of a fuel shortage), the body will remain in a constant state of readiness for fight or retreat. It will be unable to keep up with the demands, leading to the final stage of exhaustion.

#### The Effects of Personality

There is no question that personality influences the way that we react to stress. Some people have personality styles that may contribute to stress related disorders. They may feel so fearful of making mistakes, of being criticized, of doing less than a perfect job, that they withdraw from challenging situations or avoid confrontations, which result in feeling unfulfilled, frustrated, incompetent. As children, we may have learned that expressing feelings, such as anger, can get us into trouble. Thus, we express our anger indirectly or deny it altogether.

Cardiologists have described two personality behavior types which have been linked with certain diseases. Type A behavior has been seen as a major cause of coronary heart disease and is characterized by a competitive, aggressive, achievement-oriented, time-dominated orientation to life. Type A people are usually unaware that their behavior creates problems for others or is detrimental to their health and well-being, since this behavior is condoned and applauded by our achievement-oriented society.

The behavior of a Type B person, in contrast, is everything Type A people reject. Type B individuals have found a comfortable, more relaxed pace. They look at scenery with enjoyment, allow time for frequent refreshment and rest stops, really enjoy being alone or with friends and

family. Type Bs work more slowly and thoughtfully, which can permit greater creativity. They allow themselves the leisure to develop more fully as people, and have a number of outside interests, activities, and friendships. Many Type Bs have plenty of drive and achievements, but time is scheduled with a calendar, not a stopwatch. If you recognize the Type A pattern in yourself, you should consider modifying your life style. Not only will it make you a safer pilot but you will live longer as well.

How much stress is in your life?

If you hope to succeed at reducing stress associated with crisis management in the air, or with your job, it is essential to begin by making a personal assessment of stress in all areas of your life. You may face major stressors such as loss of income, serious illness, death of a family member, change in residence, or birth of a baby, plus a multitude of comparatively minor positive and negative stressors. These major and minor stressors have a cumulative effect which constitutes your total stress-adaptation capability which can vary from year to year. To enhance your awareness about the sources of stress in your life, the following life change profile questionnaire is presented. Put the mean value points in the "Happened" column if you have experienced the event described, in the last 12 months. Total your score at the end of the questionnaire.

<u>Rank</u>	<u>Happened</u>	<u>Mean Value</u>	<u>Life Event</u>
1	_____	100	Death of spouse
2	_____	73	Divorce
3	_____	65	Marital Separation
4	_____	63	Jail term
5	_____	63	Death of close family member
6	_____	53	Personal injury
7	_____	50	Marriage
8	_____	47	Lost your job
9	_____	45	Marital reconciliation
10	_____	45	Retirement
11	_____	44	Change in health of family member
12	_____	40	Pregnancy
13	_____	39	Sex difficulties
14	_____	39	Gain of new family member
15	_____	39	Business - budgets, schedules, etc.
16	_____	38	Change in financial state
17	_____	37	Death of close friend
18	_____	36	Change to different line of work
19	_____	35	Change in number of arguments with spouse or partner
20	_____	31	Mortgage or loan over \$10,000
21	_____	30	Foreclosure of mortgage or loan
22	_____	29	Change in responsibilities at work
23	_____	29	Son or daughter leaving home
24	_____	29	Trouble with in-laws or partner's family

**Life Events Stress Test Continued:**

25	_____	28	Outstanding personal achievement
26	_____	26	Spouse or partner begins or stops work
27	_____	26	You begin or end work
28	_____	25	Change in living conditions
29	_____	24	Revision of personal habits
30	_____	23	Trouble with boss or instructor
31	_____	20	Change in work hours or conditions
32	_____	20	Change in residence
33	_____	20	Change in school or teaching institution
34	_____	19	Change in recreational activities
35	_____	19	Change in church activities
36	_____	18	Change in social activities
37	_____	17	Mortgage or loan less than \$10,000
38	_____	16	Change in sleeping habits
39	_____	15	Change in number of family social events
40	_____	15	Change in eating habits
41	_____	13	Vacation
42	_____	12	Christmas
43	_____	11	Minor violations of the law

Total number of points for 12 months \_\_\_\_\_.

In a pilot study, it was found that of those persons who reported LCUs (life change units) that totaled between 150 and 199 points, 37 percent had associated health changes within a 2-year period of such life crises. Of those with between 200-299 LCUs, 51 percent reported health changes, and of those with over 300 LCUs, 79 percent had injuries or illnesses to report. On the average, health changes followed life crises by one year.

Each of us has personal stress-adaptation limitations. When we exceed this level, stress overload may lead to poor health or illness. To avoid exceeding your personal limits, learn to recognize the warning signals from your body and mind telling you when stress levels are getting too high. When you detect warning signs, it is time to take preventative action.

**Time and Stress**

The urgency of time drives most of us. No where is this more evident than in piloting a helicopter. Multiple tasks must be performed simultaneously to get them done at all. Fuel remaining is directly related to time. Passenger requirements and operating economy are often directly related to time. Demands often exceed the time available and overloading means that stress response is aroused, possibly to dangerous levels. Irritability, impaired judgment, hypertension, headaches, and indigestion are frequent early signs of distress and potential illness. This is of crucial concern in the helicopter field where one person must often make all of the decisions and perform all of the tasks alone.

Each person has a fairly well-defined sense of time urgency within which he or she works effectively and gains a sense of accomplishment.

Beyond this comfort zone of reasonable time pressure, deadlines threaten, time seems to run out, there is not enough recovery time for a change of pace, and the person begins to feel over-stressed.

A frequent reaction to time pressure is juggling, attempting to cram several activities into insufficient time. The human brain seems to lack the capacity to perform many simultaneous conscious operations efficiently because one task may interfere with another. Too many pressures, such as can be found in a series of poor judgment decisions, can lead to distress. Overloading either your mind or your aircraft can kill you.

Time stress has its own special mental aspects. One feels desperate, trapped, miserable, and often helpless. It is important that pilots learn to recognize their personal warning signs of racing against time so as to avoid that source of stress. The following could be your symptoms of chronic overload:

Do you:

Rush your speech?  
Hurry or complete other people's speech?  
Hurry when you eat?  
Hate to wait in line?  
Never seem to catch up?  
Schedule more activities than you have time available?  
Detest "wasting" time?  
Drive too fast most of the time?  
Often try to do several things at once?  
Become impatient if others are too slow?  
Have little time for relaxation, intimacy, or enjoying your environment?

Most of us go back and forth between such hurried behavior and a more relaxed schedule, but if you answered "yes" to most of the above, you may be suffering from chronic overload. Greater distress is not inevitable. Some people can and do live faster lives, because their bodies and minds can handle a faster pace. Others learn to adjust to a faster pace. You can learn ways to remain healthy while living faster. But the chance of distress is greater, especially if you are not aware of the dangers or do little or nothing about them.

#### Lead-time and After-burn

Associated with any activity are two necessary time periods - lead-time and after-burn. Consider, for example, an instructor facing an upgrading preparation needed the day before and on the morning of the test. Anticipatory stress is often useful in moderate amounts, because it prepares both your body and mind for what is about to happen. It increases sharpness and motivation, but it can also be an interference. A person pays more attention to what may happen rather than to what is happening. This reaction can cause pilots to "get behind" their aircraft causing more time pressure and distress.

After-burn is the time needed after the test to think about results and to set the experience to rest. If there is not enough time to "come

down" - to relieve tensions built up during the anticipatory stage and the pressures of the review - then the energy that surged during the experience will not be released, and the body and mind will remain stressed. A fast pace, especially if it is led by someone who needs quite a bit of lead-in and after-burn time, can be a significant source of tension, stress, and disease. Have you experienced the sore back or stiff neck which sometimes result?

#### STRESS AND FLYING

In flying, we must consider three classes of stressors: physical, physiological, and psychological. Physical stressors include conditions associated with the environment such as temperature and humidity extremes, noise, vibration, and lack of oxygen; often encountered in flight. Physiological stressors include fatigue, lack of physical fitness, sleep loss, missed meals which have led to a low blood sugar level, discomfort associated with a full bladder or bowel, and disease. Psychological stressors are the social or emotional factors related to life stressors which we dealt with earlier, or they may be precipitated by mental workload such as analyzing an aircraft or navigational problem in flight. When you need to consider only one thing at a time to reach a decision, you generally will have no difficulty making a decision. In flight, however, you will frequently have to deal with many situations simultaneously. Sometimes decisions are based on incomplete information within a short time period.

For example, in a cross-country flight, you may realize that you are much lower on fuel than you expected. The clouds ahead appear to be building, and there is considerable static on the radio. You are off course and you can't seem to find a familiar ground reference point. On top of this, you failed to take a comfort stop before the flight and you now have a full bladder. The cabin heater is not functioning properly, and you are now starting to encounter turbulence. You now have many things on you mind. You begin to worry about arriving at your destination on time or missing an important appointment. You begin to worry about a forced landing and damaging the helicopter which the boss was not keen on letting you fly in the first place.

Your palms are now beginning to become sweaty and your heart is starting to pound. You feel a growing tension, and your thinking is becoming confused and unfocused. You may give too much attention to the "what if" questions which should be ignored. You are reaching, or have already reached the overload state. It is probable that you will begin to make poor decisions that will result in a series of bad decisions. These might include pressing on into bad weather, or overflying good landing areas until you are almost out of fuel.

There can be plenty of stress with which to cope in the flying environment itself without adding to them the burden of your life stressors. On the other hand, your life stressors may be sufficiently great already. That one poor (initial) judgment can lead to a dangerous compounding of stress-creating conditions. Stress effects are cumulative. They will eventually build to a point where the burden is intolerable unless you know how to cope.

### Stress and Performance

Let us review our major conclusions. Stress has a cumulative effect; some degree of stress can be of assistance in some situations, and stressors which persist over a long period can severely affect our performance and health. So stress would seem to have a positive effect on performance when it is moderate, performance will peak at an optimum level of stress, then decline as stress increases further. Furthermore, complex or unfamiliar tasks require a higher level of attention than simple or over-learned tasks. Complex and unfamiliar tasks also are adversely affected by increasing levels of stress.

Everyone operates most effectively at some moderate level of stress. The relationship between stress and performance that has been verified in numerous experiments is shown in Figure 7-1. At very low levels of stress, motivation and attention are minimal and performance poor. As the level of attention and motivation increase, so does stress and performance. However, at very high levels of stress, panic ensues and performance deteriorates dramatically.

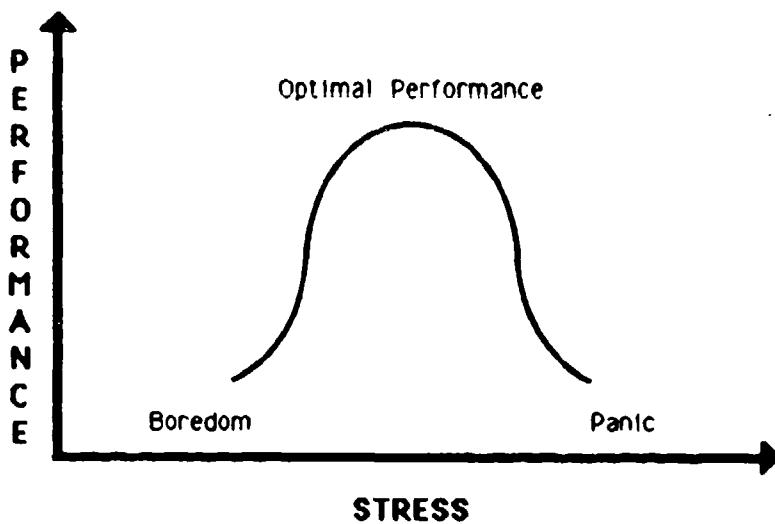


Figure 7-1 Relationship between stress and performance.

In flying, accidents often occur when the task requirements exceed pilot capabilities, especially when stressors such as fatigue and emotional complications are involved. The difference between pilot capabilities and task requirements is shown in the "Margin of Safety" diagram shown in Figure 7-2. The margin of safety is minimal during the approach. If an emergency or distraction occurs here, or anything degrading the pilot's capabilities, the risk of an accident increases substantially.

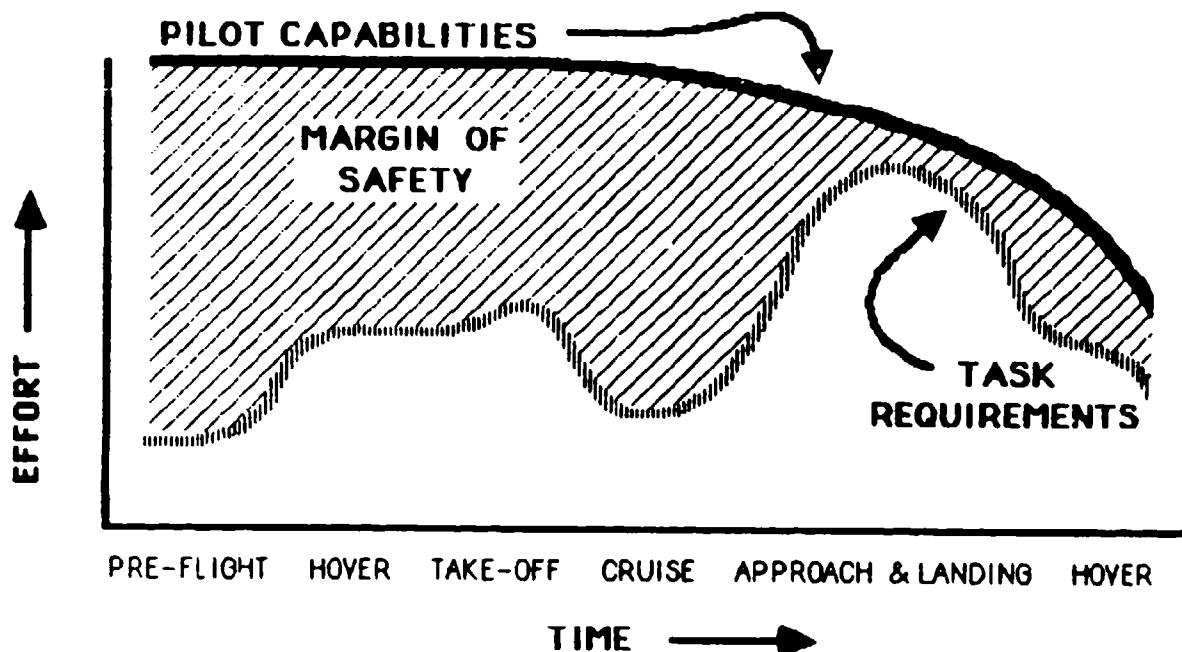


Figure 7-2 Conceptual diagram of margin of safety over the duration of a flight.

#### COPING WITH STRESS

Up to this point, we have focused upon what stress is, and how it can affect us. Now, we turn our attention to how we might best cope with stress. By learning the goals and principles of coping, you can use stress constructively to promote good health, self-development, and flight safety.

As stated previously, stress is the product of an entire lifestyle. It is not just the product of an occasional crisis. Consequently, each person must learn to monitor personal internal arousal levels and find ways to relieve stress. Health can be protected by using constructive coping responses to balance stress. For example, you can simply take a five minute break and relax. In flying, the appropriate time might be after reviewing the approach procedure and before beginning the approach.

Total Body Approach. One of the best ways to cope with stress over all is to use the "Total Body Approach" or the "Wellness Concept." The objective of this concept is to attack the problem before it becomes serious. The total body approach takes account of all six aspects of well-being:

1. Physiological
2. Nutritional
3. Environmental
4. Emotional
5. Spiritual
6. Lifestyle Values

What you do in one of these areas supports, enhances, and capitalizes on action in the other areas. For instance, poor eating habits may increase your stress level, leading to weight problems and lack of vitality. This lack of energy may slow down productivity and lead to increased pressure at home and at work to get things done. The pressure can lower your self-esteem or defensive behaviors, thus throwing your entire lifestyle out of balance and increasing your stress to unhealthy levels.

Changing the Stressor. Behaviors consistent with good health and low stress are:

1. Minimizing or stopping activities detrimental to your health, such as smoking or drinking to excess.
2. Increasing health-producing behaviors such as relaxing at regular intervals.
3. Using self-regulation and self-control information, such as appropriate time management and thought stopping (deliberately stopping yourself from thinking negatively).
4. Being trained in health promotion strategies and technologies. These would include simple techniques as "time out" (a five-minute shut down when you recognize that stress is increasing - you can do this quite effectively in your workplace), or taking the phone off the hook if you need to solve one problem at a time.
5. Accepting responsibility for your own health, by developing a stress reduction program.

#### Poor Coping Response

Flexibility and developing a creative range of coping behaviors enable people to handle considerable stress. A limited coping repertoire may be harmful. For instance, if eating or drinking is the primary coping response to stress, obesity or alcoholism is like to present its own problems. It is a bad idea to use "addictive" solutions to handle life stressors. Other potentially destructive responses include violence, procrastination, drug abuse, overwork, poor sleeping habits (sleep disorder), compulsive spending sprees, total withdrawal, and caustic remarks. They make a problem worse or initiate a new one rather than improve anything.

Living with Distress. This is perhaps the least acceptable approach to dealing with stress. It may be necessary for short periods of time, but it does not promote long term health. For instance, the intensity with which a concert pianist prepares for a Sydney Opera House performance is both invigorating and grueling. The temporary sacrifice is made to reach a goal, but does little lasting harm. Unfortunately, some people are almost addicted to stress and go to great lengths to create distressful situations. These people not only live with the distress: they wallow in it, playing out "loser" and "poor me" life scripts or trying to show how tough they are.

Withdrawing from the Stressor. There are several coping responses that enable one to get away from a distressful situation when other approaches have not reduced the distress. Leaving the scene for a while by recessing a meeting or taking a walk, a day off, a nap, or a vacation

can be healthy responses to restore vitality and relieve overload. If you are in a commercial flying job in which you are constantly facing a superior who places all the responsibility on you for "go/no-go" decisions, it may be time to withdraw.

However, like other coping responses, this approach can be constructive or destructive, depending upon when and how it is used. It can provide a change of pace and renewal or it may merely be a means of escape and, in fact, create more stress. This avoidance technique can create further problems unless it is used as a means of reducing the present level of stress, and not a way of withdrawing from the problem or its solution.

A more permanent move, such as changing your job, place of residence, or relationship, should be considered as a last resort in most cases. When the stressor cannot be changed (for instance, the crowding and noise of city life) and to remain in the same environment would mean living with perpetual distress, withdrawal may be the most viable coping response. But usually there are alternatives by means of which you can moderate the negative stressors in your life without leaving the stressful situation.

Changing how you relate to the stressor. Changing how you relate to the specific stressors in your life means altering the relationship between yourself and the demands. The source of your tension may be an over-demanding chief pilot who assigns you a flight late in the day when you are already fatigued and then berates you for falling behind schedule. Being more assertive and candid with your boss about your work schedule and time demands, suggesting alternatives, and understanding his scheduling problems can defuse the daily tension. Other ways of changing the stress link are:

- Developing new skills
- Establishing a support network of close friends
- Being more diplomatic
- Being tolerant of others' imperfections and your own
- Broadening your perspective

Changing the stressor. Although some situations are beyond our control (for example, the erratic movement of a low pressure system into your flight path, and an incomplete maintenance release), this is not true for all stressors. You can change many features in your environment that adversely affect your safety, health, and self-development. For instance, you can change others' actions toward you to the degree to which you alter your behavior. Distractions or discomfort associated with heat, lighting or noise can often be simply controlled. Frequently changing jobs, cities, homes, or partners could overload your coping mechanism. The ideal is to change those things you can and accept those you cannot change by tolerating them and recognizing your own limitations.

Accepting the situation and lowering stress. There are several ways

to lower the stress experienced when a situation cannot be changed:

Moderation  
Relaxation  
Exercise  
Communication with confidant  
Professional counseling and therapy  
Rest  
Religious faith and practice

The selection of specific ways of managing stress is a matter of individual choice and circumstances. Consider:

1. In what ways will a particular choice or action promote your own good health and minimize distress?
2. In what ways will your efforts promote the health and development of others and reduce distress?

In this manner, stress is mobilized as a positive force.

Here is an exercise to try right now. Close your eyes and recall the last time you felt distressed. Try to recall how you reacted to that stress. Decide if it was primarily a physical and mental reaction. Many of us, when under intense stress, react both physically and mentally, but most of us favor one mode or the other. When you have a good idea of your usual mode of expression, open your eyes.

We will now review three modes of reacting to stress and describe some methods that work well for each mode. Think about the method which might best suit your needs. The first mode of reacting to stress is with our bodies. The following techniques are useful for those people who suffer physical symptoms such as headaches, backaches, stiff necks, tense or rigid bodies, ulcers, high blood pressure. These techniques take some time to learn. The effectiveness of each is dependent upon regular and considered use.

Deep muscle relaxation is a passive process that involves getting yourself into a relaxed position on a comfortable chair or lounge and then focusing your attention on various muscle groups throughout the body. First you tense, then release each group of muscles while saying to yourself "Relax, relax, relax" to build up an association between mental process and physical relaxation. Eventually, it enables automatic relaxation when one thinks "Relax".

Progressive relaxation is a similar technique, except that you do not tense your muscles. Instead, you mentally suggest relaxation by thought, like, "My feet are completely relaxed, my feet are completely relaxed", while consciously relaxing foot muscles. Progressive relaxation is often accompanied by deep breathing or visualization techniques.

Deep breathing exercises can reduce tension by producing a deep state of calmness and relaxation. When you breathe softly and slowly, it is difficult for your emotions to become aroused out of a tranquil state. Deep breathing relaxation can be accomplished by simply breathing for a

count of 3; holding for another count, and exhaling slowly to the same count. Several disciplines include breathing exercises as part of their relaxation strategies. In yoga, "pranayama", or control of the life force, is an important study. Since we all have to breathe anyway, controlling your breathing is a quick and easy way to help relieve tension.

### The Internal Environment

We can improve our internal environment by training and shaping our minds. Loosening up inhibitions, overcoming our limitations, and working on developing a positive attitude toward life are all important aspects of a well-rounded, stress-controlled existence. Consider how you can use these strategies to help yourself deal with stressful concerns. These strategies will be helpful both in dealing with daily stress levels and also reduce the chance of high stress levels and panic in flight situations.

Positive attitude. Develop a positive attitude towards life. Put stressors in a favorable context. Some stress is useful or necessary, remember? Recognize the beneficial aspects of stress, and use the power of positive thinking. Your attitude determines whether you perceive any experience as pleasant or unpleasant.

Take it easy. Many of us take things too seriously and need to learn to take one thing at a time. When we worry too much, we need diversion, something to put in the place of worrying, a pleasant thought. A thought stoppage (stopping negative thought patterns by shouting words like "stop" or "no" in the middle of an anxious series of thoughts), or a change of scene (e.g. going to a movie, reading, visiting a friend, doing something to escape from your routine) are useful.

Exercise. Inactivity is a serious health hazard. Exercise is one of the key elements to long life because it protects us by preventing or reversing physical illness, reduces physical tension and anxiety, and increases the quality of our lives. Aviation, for the most part, is a sedentary activity. We sit in an aircraft for long periods without any physical exertion. Health researchers strongly recommend that we build into our weekly activities at least three, 30-minute periods of some vigorous exercise. They add two important cautions:

1. Strenuous exertion by a middle-aged, overweight, sedentary person can be hazardous. For such persons, a medical evaluation is essential before beginning an exercise program.
2. Exercise alone will not reduce risk of coronary heart disease.

Diet. An important part of any stress management program is a nutritionally sound diet. The medical profession has provided a number of excellent suggestions for reducing stress through sound nutritional habits. Read and follow these suggestions.

### Improving Your External Environment

There is no panacea to help us manage stress. Our chances of success

are increased if we take an overall approach to managing stress by giving attention to the three areas: physical, mental, and emotional. Complete the following guide for stress reduction.

1. One way I can reduce unnecessary noise and irritations around me is to:

2. The amount of sleep I need each day in order to be maximally alert and able to cope with stress is:

3. I presently get that amount of sleep or rest.

Yes \_\_\_\_\_ No \_\_\_\_\_

4. (For those who answered No to the previous question.):

A way I could rearrange my schedule in order to get enough sleep is:

5. Some changes or crises I foresee over the next year are:

6. Ways I can deal with these stresses are:

#### Coping with Stress While Flying

1. Identify kinds of stress you experience.

When does it occur?

How frequently?

Under what conditions does it occur?

Are any bad habits involved (refer to the 5 hazardous attitudes)?

2. Prioritize which job stresses bother you most.

Choose one to work on first.

3. Review coping methods you've tried with what degree of success or failure?

4. Consider possible solutions.

Which can be implemented with most ease?

Who can help with implementation?

5. Resources:

Physical.	What is your level of health, energy, sleep requirements.
Emotional.	Honestly appraise your emotional strengths and weaknesses.
Social.	How well do you relate to others? Do you have others you can turn to for support or help with problems?
Intellectual.	Give yourself credit for your abilities and interests.
Spiritual.	Your beliefs about what really matters.

Cockpit Stress Management

Most pilots give their aircraft a thorough preflight, yet many forget to preflight themselves. We suggest you use the "I'M SAFE" checklist before you decide to fly.

---

**Are You Fit To FLY?**  
**The "I'M SAFE" Checklist**

---

<input type="checkbox"/> <b>I</b> llness?	Do I have any symptoms?
<input type="checkbox"/> <b>M</b> edication?	Have I been taking prescription or over-the-counter drugs?
<input type="checkbox"/> <b>S</b> tress?	Am I under psychological pressure from the job? Do I have money, health or family problems?
<input type="checkbox"/> <b>A</b> lcohol?	Have I had anything to drink in the last 8 hours? The last 24 hours? Do I have a hang-over?
<input type="checkbox"/> <b>F</b> atigue?	How much time since my last flight? Did I sleep well last night and am I adequately rested?
<input type="checkbox"/> <b>E</b> ating?	Have I eaten enough of the proper foods to keep me adequately nourished during the entire flight?

---

Some specific suggestions: Before you make a long flight stay away from excess liquids, especially caffeine--it acts as a diuretic. Never fly when you are angry or emotionally upset. Never get into a situation where you must get to your destination at all costs. If you can't afford the time or money to wait on the ground until weather conditions improve, your hangover goes away, or your aircraft is fixed, don't go. Also don't allow passengers to dictate when it comes to safety matters, such as the amount of baggage, or where and when to go. You alone are pilot-in-command; you alone must make the go/no-go decision.

When you are carrying passengers make sure that they are calm, informed, and prepared. If you should encounter an emergency, keep them informed if you can find the time. Above all, avoid situations that distract you from flying the aircraft.

If you feel tension mounting, you might loosen your collar, shift position, open air vents. Don't hesitate to ask controllers to help, for instance, to speak more slowly or to give you a position fix. Experienced passengers can be asked to look for landmarks and traffic, or even ask suitably qualified passengers to assist in radio communications. The point is--reduce your workload to reduce stress levels--provide yourself with the proper environment in which to make sound judgments.

And, if an emergency does occur, BE CALM--think for a moment, weigh the alternatives, then act. Remember that fear and panic are your greatest enemies during an in-flight emergency. Also, don't hesitate to declare an emergency when necessary or let other people including passengers know about your situation. Don't delay until it is too late!

Another situation that may generate stress involves letting little mistakes bother you until they build into a "big thing." If you make a mistake which you detect and correct, the most sensible thing to do is to forget about it and return your entire attention to flying. Don't keep thinking, "Why did I do it?" "How could I have been so stupid?" "Where did I go wrong?" or "What happens if I do it again?" If you do this, your mental energies and attention will be distracted from the job of flying. Wait until after you land, then "debrief" and analyze past actions.

Finally, if flying is adding to your stress, then you had better quit. But if it helps you to cope with your life by providing an enjoyable means of earning a living or as a hobby to take your mind off everyday cares, then relax and enjoy! Learning to handle your stress will enable you to have a happier, more productive life.

And Remember.....

A superior pilot uses superior judgment to avoid stressful situations which might call for the use of superior skills."

Anon

## 8.0 HEADWORK

The headwork response process involves orderly, timely decision making. The ADM program presents a process approach to decision making which differs from many of the traditional methods of teaching judgment based upon personality attributes. The traditional approach to pilot training is to teach student pilots the capabilities and flight characteristics of an aircraft and its systems, knowledge of the national airspace system, general knowledge of meteorology, regulations, emergency procedures and "stick and rudder" skills, the premise being that, if student pilots have this kind of information, they will be able to exercise the "good judgment" required to assure safe flight.

Since aeronautical decision making is a mental process, pilots can be taught to make good decisions in the first place or to diminish the impact of previous poor judgments. A pilot is expected to do more than skillfully resolve emergencies as they occur. It is equally important to actively avoid those situations that might lead to emergencies by recognizing early signs of impending trouble and taking corrective action before a critical situation can develop.

Finally, outcome prediction is a key element of the headwork response process. As a pilot considers an action, the consequences of taking, as well as not taking, that action must be carefully considered. To assist pilots in this process, the AOPA Air Safety Foundation has developed a decision making training program based upon previous experience in researching the decision making process. The initial decision model consisted of the following steps:

1. UNEXPECTED CHANGE OCCURS/EXPECTED CHANGE DOESN'T OCCUR/DESIRED CHANGE DOESN'T OCCUR - To the pilot, this begins the headwork response process. The key is that some change occurs in the flight, a change from normal, or from the expected condition, or from the desired condition. In the case of expectation, it seems that there is sometimes a difference between what a decision maker expects to happen (implying certainty) and what the decision maker may hope will happen (implying uncertainty).
2. CHANGE EMITS SIGNAL - The decision maker needs a signal from the change before reaction can begin. In many instances, the decision set is relatively brief and the change emits a signal, however, there are instances where the change may occur and the decision maker does not receive a signal for a period of time, e.g., a controller does not know if an aircraft is low on fuel until informed by the pilot. In this example, the decision set is operating even though the controller cannot act.
3. DECISION MAKER DETECTS SIGNAL - As mentioned previously, an important element in the process is the detection of change.
4. DECISION MAKER CORRECTLY UNDERSTANDS SIGNAL MEANING - The pilot foresees the implication of the change on the outcome or success of the flight.

5. DECISION MAKER RECOGNIZES THE NEED TO COUNTER OR REACT TO CHANGE - Decision makers usually need to counter a change since many of the changes noted have potentially negative outcomes. In some instances, the change is benign in its occurrence, e.g., a controller may not react to a call from a pilot due to heavy involvement with other communications. Responding to a pilot's call is not an act of countering, but is one of reaction.
6. DECISION MAKER SEEKS POSSIBLE ACTION OPTIONS - The decision maker recalls or seeks options to counter or react to the change.
7. DECISION MAKER ESTIMATES THE LIKELY OUTCOME OF THE OPTIONS SELECTED - This requires a projection of the events likely to occur from each of the selected options.
8. DECISION MAKER PICKS BEST ACTION TO CONTROL CHANGE - This is selecting an action that successfully modifies the change.
9. DECISION MAKER ACTS TO ADAPT TO THE CHANGE - Action is either taken or not taken.
10. DECISION MAKER WATCHES FOR EFFECTS OF THE COUNTERING ACTION OR REACTION - The decision maker may or may not stay involved in the decision process by monitoring his or her action to achieve the desired outcome.

For purposes of teaching pilots the elements of the decision making process, the original model was too complex and was reduced to a six element decision process using the acronym "DECIDE". The steps in the DECIDE process are:

1. DETECT - The decision maker detects the fact that a change has occurred.
2. ESTIMATE - The decision maker estimates the need to counter or react to the change.
3. CHOOSE - The decision maker chooses a desirable outcome (in terms of success) for the flight.
4. IDENTIFY - The decision maker identifies actions which could successfully control the change.
5. DO - The decision maker takes action to adapt to the change.
6. EVALUATE - The decision maker evaluates the effect(s) of the action countering the change or reacting to it.

The six elements of the DECIDE model are a closed loop decision process. The model has been used during accident analysis and during the instruction of pilots of varying experience levels. Figure 8.1 graphically depicts how this condensed version of the original model provides a self-reinforcing training approach in the ADM training program.

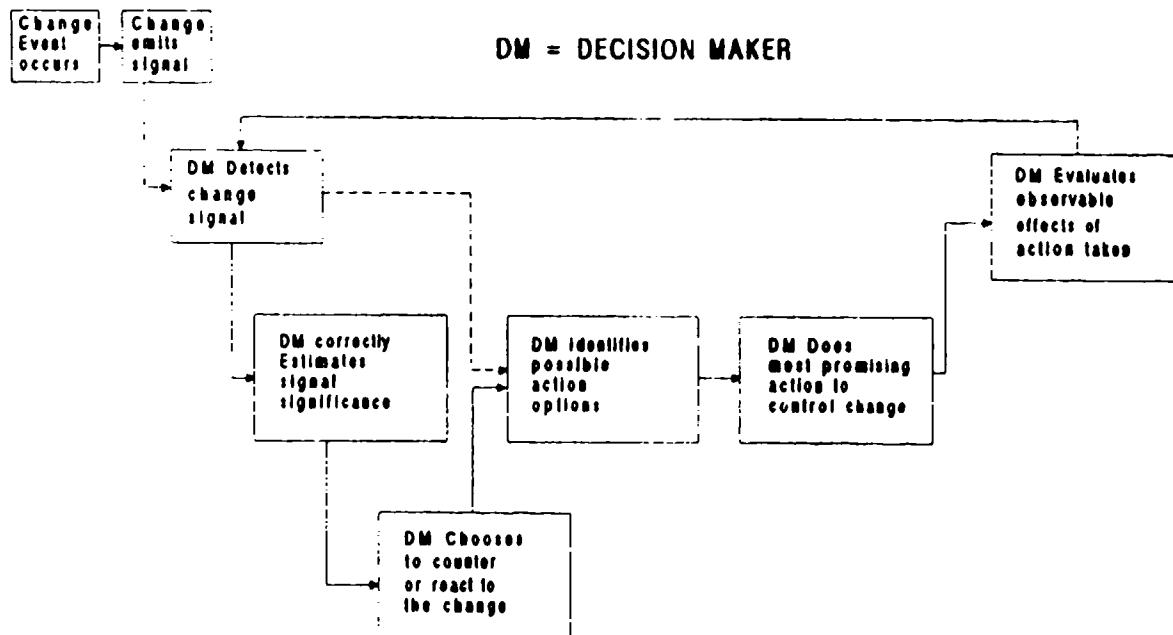
### Risk Management

The effects of the change and its probable influence on the safe outcome of the flight must be continually evaluated. An assessment of the risks created by the change helps to focus on those alternatives which are realistic and will produce a safe outcome. This also forces a projection of the events likely to flow from each possible alternative, and, hopefully, results in a rejection of those alternatives which are not realistic.

Risk management includes several previously discussed ADM subject areas such as pilot, aircraft, environment and operational pressures. It is necessary to make an educated guess how change will affect the outcome of the flight. Recognizing the need to react or counter change is the critical element in this step, regardless of whether the change is dramatic, requiring immediate attention, or the change takes place over time, allowing further analysis of the situation. Chapter 3 has discussed how to recognize, analyze and manage risk in detail.

### Crew Management

This refers to cockpit resource management methods of making the best use of all crew members (when others are present) through proper communication and coordination techniques. This area is an important adjunct in individual decision making and is covered in more detail in a separate manual.



(Source: Adapted from HAZARDOUS MATERIALS EMERGENCIES, Events Analysis, Inc.)

Figure 8.1 Pilot Decision Making Process Model

## 9.0 APPLYING DECISION MAKING CONCEPTS

The following material will not present any new information about flight, decision making, or stress. Rather, this material will reinforce your understanding and appreciation of the material you have studied up to now.

The following exercises require you to apply your newly acquired knowledge to true-to-life situations. The examples and scenarios used in these exercises are based on actual stories of pilots who made unfortunate errors by failing to exercise good judgment.

If you do not clearly remember the four subject areas, the five steps in good decision making, the hazardous thought antidotes, etc., you should now go back and review them before continuing. Before you begin the applications exercises, test your recall of the material by filling in the blank spaces below with the correct information.

The five basic risk elements are:

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To check your answers, turn to page 7 and read through the section again.

The six steps in good decision making are:

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Check your answers by turning to page 98. If you were unable to list the six steps in the correct order, take some time to read through and memorize the material in Figure 8.1.

The five hazardous attitudes are:

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Check page 45 for the correct answers. Memorize the hazardous thoughts before proceeding.

The hazardous attitude antidotes are:

Hazardous Attitude	Antidote
_____	_____
_____	_____
_____	_____
_____	_____

Turn to page 65 to check your answers. If you had any trouble recalling the antidotes, take five minutes now and memorize them before you begin this section. Cover your answers above with a sheet of paper before you start. When you know the antidotes by heart, write them in the spaces below.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

The following exercises are to be completed under the supervision of your flight instructor. Upon completion you are encouraged to review each exercise with your instructor in order to gain further insight into the judgment decision making process.

#### A. PREFLIGHT DECISION MAKING

##### Introduction

Any mechanical problem is a very serious and dangerous matter once the helicopter is airborne. Manufacturers, maintenance personnel, and government regulatory agencies work hard to keep each helicopter as safe as possible. However, things can go wrong, and maintenance personnel do make mistakes. It is the pilot who must make the final decision regarding the airworthiness of his or her aircraft before each flight.

Here are some examples of common situations involving poor judgments in relation to preflight actions and aircraft systems:

- Assuming maintenance work was done correctly
- Failing to do part or all of the standard preflight inspection
- Carelessness during the preflight check; for example, leaving gas or oil caps loose or off
- Incomplete checking of flight controls for freedom of operation
- Not adequately checking aircraft systems prior to takeoff
- Not acknowledging the importance of each system; for example, taking off with an inoperative radar altimeter
- Improper use of aircraft systems
- Inadequate understanding of aircraft systems

## Situation Analysis Exercise

### Directions:

Read the following, which tells a story about a pilot who got into trouble because he made a poor decision during preflight. When you finish, answer the questions following the scenario. Circle the correct answer. The sentences in this and the following exercises have been numbered for your convenience.

### Pilot's Report:

(1) I hovered away from the airport helipad about 15 minutes later than I had planned. (2) As I airtaxed toward the runway, the tower called me. (3) They said they thought they saw fresh oil on the side of the transmission cowling. (4) I did not want to stop and check the problem because I was determined to get to Remotesville on time to impress my boss. (5) I figured I should do something right away to get the tower off my back, so I decided to ask for a takeoff from the taxiway in order to quickly get out of their sight. (6) While requesting clearance for takeoff, I casually said that.. "All helicopters leak a little" to put them off.

(7) As I started to pull the collective, I noticed an unusual humming sound. (8) The helicopter was accelerating through translational lift, but I found I needed to add right pedal instead of the normal left and I was having difficulty in maintaining takeoff heading due to the confusion. (9) The narrow taxiway - with high grass on both sides - did not help matters. (10) Before I really knew what was happening, the warning light came on, the humming became a grinding sound, and the nose started to yaw uncontrollably to the left and I realized that I had an impending transmission seizure. (11) I closed the throttle and entered autorotation but the tailboom continued to swing out over the right edge of the taxiway into the tall grass. (12) By then I figured there was nothing I could do to overcome this, so I just let the helicopter settle to a landing in a left turn. (13) I was so busy cursing my bad luck that I did not notice the underground fuel system pump box until it was too late. (14) The tailboom hit it just as the helicopter came to rest on the skids which caused the tailrotor transmission and rotor to break off their mounting. (15) It really makes me mad to think that the whole thing was due to a transmission oil filler cap being left off. (16) I probably would have noticed it if I had not rushed my preflight inspection.

### Questions:

1. In sentence 4, the pilot's attitude was probably the hazardous one we call:
  - a. Impulsivity
  - b. Invulnerability.
  - c. Macho

- d. Resignation

2. In sentence 4, the risk element which influences the pilot's decision to continue was:

- a. Pilot
- b. Aircraft
- c. Environment
- d. Time

3. In sentence 5, the pilot's attitude was probably the hazardous one we call:

- a. Anti-Authority
- b. Impulsivity
- c. Macho
- d. Resignation

4. What risk element was the pilot making a judgment about in sentence 6?

- a. Pilot
- b. Aircraft
- c. Environment
- d. Aircraft/Environment

5. What hazardous attitude could the pilot be using in sentence 12?

- a. Anti-Authority
- b. Impulsivity
- c. Invulnerability
- d. Resignation

6. What is the antidote for the hazardous attitude displayed in sentence 12?

- a. "Not so fast, think first."
- b. "It could happen to me."
- c. "I can make a difference."
- d. "Follow the rules."

7. What risk element was the pilot's attention being directed to in sentence 13?
  - a. Pilot
  - b. Aircraft
  - c. Environment
  - d. Pilot/Aircraft
8. Earlier in this manual you were taught that an important step in analyzing the decision chain was to "Diagnose the original poor judgment to provide feedback needed to avoid making a similar poor judgment in the future." Which sentence indicates the pilot is taking this step?
  - a. Sentence 4
  - b. Sentence 11
  - c. Sentence 12
  - d. Sentence 16

#### B. WEIGHT/BALANCE AND PERFORMANCE

##### Introduction

Engineers design a helicopter to fly safely and efficiently. One design factor that is very important to safe operations, as well as operating efficiency, is the weight and balance criteria. Flying a helicopter loaded beyond its weight and balance limitations may create dangerous changes in control and performance characteristics that can cause or contribute to serious accidents.

Of course, performance is dependent on factors in addition to weight and balance. For instance, density altitude, surface temperature and winds are very important considerations.

Here are some examples of common poor judgments relating to weight and balance and aircraft performance:

- Estimating passenger and cargo weights instead of making exact calculations
- Knowingly exceeding weight and balance limitations to accommodate the desires or demands of supervisors, customers, friends, etc.
- Loading the aircraft as one would a car with no regard to total weight or distribution of the load
- Failing to secure cargo to prevent it from shifting while in flight or in case of an accident

- Forgetting or ignoring density altitude, prevailing wind conditions, or other factors that affect helicopter performance
- Trying to make full power takeoff when other than standard conditions exist

### Situation Analysis Exercise

#### Directions:

Read the following pilot report, a story of a pilot who got into trouble because of poor weight and balance decisionmaking and the effect on performance. When you finish, answer the questions following the scenario.

#### Pilot's Report:

(1) When I did my hover check after picking up the fire fighters at the bottom of the canyon, I knew that the helicopter was only about 20 pounds under max gross weight. (2) What I failed to realize was that they had stowed some of their heaviest gear in the baggage compartment which shifted the C.G. to slightly behind the aft limits. (3) At departure, the temperature was 93°F (34°C) and the pressure altitude was 6,200 feet.

(4) Because weight and balance had never created any problems for me in the past I did not bother to calculate C.G. and power required. (5) I did try to estimate it, however, by remembering my figures from earlier in the morning at the base camp. (6) At maximum gross weight and a density altitude of 5000 feet, the chart in the back of the handbook had assured me that the power available exceeded the power required by a sufficient margin. (7) Since I had enough power for the hover check, even though I was at a higher elevation in the canyon, I was sure there would be no problem.

(8) The wind was blowing down the canyon from the closed, or "box", end, so I decided to take off in that direction - away from the fire. (9) From the hover, I carefully added power and put the nose over but the helicopter accelerated very slowly. (10) Nearing the upwind edge of the LZ, still in ground effect, I thought about aborting, but the speed and height above the ground gradually continued to increase. (11) I finally "pulled pitch" after passing through translational lift, figuring either it would fly or it wouldn't.

(12) Then my real problems began. (13) As I attempted to establish best rate-of-climb, I found the nose wanted to pitch up to a higher than normal attitude. (14) Next, I noticed that I was not gaining enough altitude in relation to the canyon wall a couple of hundred yards ahead. (15) Worried, I felt I had to do something right then, so I pulled up on the collective and back on the cyclic to try to gain some altitude quickly. (16) The helicopter became very difficult to control.

(17) As the canyon wall grew closer, the only things increasing were the level of vibration and my heart rate - not the altitude. (18) With

the box end of the canyon less than a 100 yards away now, I concluded the helicopter did not have enough power to clear it. (19) I decided that my only hope was to turn back to the LZ on the canyon floor. (20) To say the least, the turn was very unnerving. (21) At one point in the turn the airspeed dropped off to almost zero and, as I reversed direction, the nose down angle nearly reached 45 degrees. (22) But, it was my only way out. (23) As I pulled collective pitch to reduce the rate-of-descent, the rotor RPM dropped dangerously low and aircraft control was unstable because of the improper loading. (24) Somehow, though, I succeeded in getting safely back to the LZ

Questions:

1. Which sentence indicates the pilot did not do something he should have done?
  - a. Number 1
  - b. Number 4
  - c. Number 6
  - d. Number 8
2. The pilot's attitude at the decision point referred to in question 1 was probably the hazardous one called:
  - a. Impulsivity
  - b. Invulnerability
  - c. Resignation
  - d. Anti-Authority
3. Which sentence suggests the pilot did something too late?
  - a. Number 7
  - b. Number 8
  - c. Number 9
  - d. Number 10.
4. The pilot's attitude at the decision point referred to by sentence 11 was probably the hazardous one called:
  - a. Impulsivity
  - b. Invulnerability
  - c. Macho
  - d. Resignation

5. The pilot's attitude at the decision point referred to in sentence 15 could be the hazardous one called:

- Impulsivity
- Invulnerability
- Macho
- Anti-Authority

6. The correct antidote for the hazardous attitude referred to in question 5 could be expected to call the pilot's attention to:

- The rule about loading the heaviest passengers to the front of the aircraft.
- The real possibility that being overloaded might cause the helicopter to crash.
- Sudden overcontrol of cyclic or collective pitch in overload or high altitude operations may induce blade stall.
- The pilot, not "Lady Luck," needs to do something quickly.

7. One principle of the decision making process states that, "As the poor decisions increase, the alternatives for safe flight decrease." Which sentence best illustrates this principle?

- Number 11
- Number 13
- Number 17
- Number 19
- Number 23

8. Do you think the pilot fully considered his aircraft during this series of events?

- Yes
- No

Why?

9. Do you think the pilot fully considered his environment during this series of events?

- Yes

b. No

Why?

## C. PROCEDURES AND COMMUNICATIONS

### Introduction

There are numerous rules, procedures, and regulations that control aircraft operations. In the United States, the Federal Aviation Regulations (FAR's), the Airman's Information Manual (AIM), and various Advisory Circulars (AC's) contain information that every pilot should know and use correctly at all times. In Canada, the Air Regulation Air Navigation Orders and A.I.P. Canada should be reviewed periodically. Airport procedures, radio communications, and navigation aids are all designed to make flying safer by having every pilot conform to standard systems and procedures.

There are a number of ways pilots can endanger themselves and others because of poor judgments in relation to official rules and procedures. Here are some examples:

- Failing to learn regulations and procedures correctly
- Failing to review regulations and procedures that have become unclear or have been forgotten over time
- Not keeping current on changes and additions to official information
- Ignoring the rules and procedures
- Failing to get further explanation when something seems confusing or illogical
- Failing to be assertive and to challenge apparent mistakes when an official source of information, such as a controller or a government publication, seems to be in error

### Situation Analysis Exercise

irections:

Making judgments about received information is a very important part of a pilot's workload. Sometimes even official information can be confusing or incorrect. The following scenario tells the story of a pilot who was led astray by such information. When you finish, answer the questions following the scenario.

#### Pilot's Report:

(1) I got up early and watched the television weather. (2) Conditions looked good for my route of flight, except for a squall line

due to move in from the northwest during the afternoon. (3) At the airport the FBO was not open, and I couldn't find a pay phone. (4) I, therefore, did not get a complete weather briefing. (5) Since I expected a routine flight, I decided not to file a VFR flight plan. (6) Once in my helicopter, I tuned in the ATIS broadcast which reported the local weather to be VFR, wind out of 090° at 10 knots, altimeter setting 30.29 inches.

(7) I took off, and I switched my radio to departure control. (8) The controller said, "Left 360, climb to 1,500, follow river." (9) I read back, "Roger, a left 360, climb to 1,500." (10) The departure controller responded, "Follow traffic at 10 o'clock, 4 miles." (11) I replied, "Doing a left 360 and looking for traffic." (12) I thought that a 360° turn just after takeoff was very unusual, but I trusted the controller and did it anyway. (13) About half way around, the controller said, "What are you doing? You were supposed to roll out on a heading of 360°." (14) I immediately turned back to 360° and departed the airport traffic area without further incident.

(15) As I headed west, I could see convective activity in the distance off to my right. (16) About half an hour later, I feared I would soon be flying into IFR conditions. (17) I got out my sectional chart to look for an alternate landing site. (18) Fortunately, I was close to Lakeville, an airport where I had landed a few times in years past. (19) I headed there right away. (20) I arrived near the field about 10 minutes later, and I began to circle the field, look for traffic, and determine the surface winds.

(21) All of a sudden, I saw an aircraft at my altitude (3,000 feet indicated) on a direct collision course from my 2 o'clock position. (22) Since I was there first, I decided to continue on my course, and the other aircraft quickly passed under my hull. (23) I then tried to establish radio contact on what I thought was the UNICOM frequency for Lakeville. (24) Another pilot answered my call, and advised me to contact Lakeville tower on 120.7. (25) I thanked him and took a second look at my sectional chart: It was over 10 months old!

(26) The tower told me to enter a downwind for runway 12 at pattern altitude, and they gave me an altimeter setting of 30.31. (27) As I moved to reset my altimeter, I was surprised to find it was set at 29.29. (28) I must have erred when I set it from the ATIS broadcast at my departure airport! (29) That explained the near midair collision--I was 2000 feet above pattern altitude.

Questions:

1. Which of the risk elements is neglected according to information in sentence 4.
  - a. Pilot
  - b. Aircraft
  - c. Environment

- d. Time

2. Which sentence illustrates the beginning of the decision making process?

- a. Number 2
- b. Number 3
- c. Number 4
- d. Number 5

3. Which antidote is appropriate for the hazardous attitude that may be present in sentence 5?

- a. "Not so fast. Think first."
- b. "Follow the rules. They are usually right."
- c. "I'm not helpless. I can make a difference."
- d. "It could happen to me."

4. What risk element was ignored by the pilot in sentence 12?

- a. Pilot
- b. Aircraft
- c. Environment
- d. Operation

5. Which hazardous attitude is shown by what the pilot says in sentence 12?

- a. Anti-Authority
- b. Resignation
- c. Macho
- d. Impulsivity

6. Which combination of risk elements is of greatest concern to the pilot in sentence 21?

- a. Pilot/Environment
- b. Pilot/Aircraft
- c. Environment/Aircraft
- d. Pilot/Aircraft/Environment/Time

7. What hazardous attitude might the pilot have had in ignoring the right-of-way regulations in sentence 22?
  - a. Anti-Authority
  - b. Macho
  - c. Invulnerability
  - d. Resignation
8. In sentence 28 the pilot noticed he had misunderstood information from the ATIS. To which risk element or elements would a pilot have to pay careful attention in order to notice such an error?
  - a. Pilot
  - b. Environment
  - c. Pilot/Environment
  - d. Aircraft/Environment

#### D. CROSS COUNTRY FLYING DECISIONS

##### Introduction

For many pilots, cross country flying can be exciting, but as anticipation builds, a pilot may view his abilities in an unrealistic, overconfident manner. Another pilot may tend to view cross-country flights as routine and become complacent. In either case, poor judgments before and during the flight can lead to risky situations and accidents.

Some examples of poor judgments related to cross-country flight are:

- Carelessness when obtaining a weather briefing
- Lack of familiarity with the helicopter
- Poor planning of route, fuel requirements, etc.
- Inadequate use of navigational aids, check points, and constant "situational awareness"
- Over extension of skills especially in weather conditions
- Failing to ask for help when a problem occurs.

## Situation Analysis Exercise

### Directions:

The following report tells of a pilot whose judgment with regard to planning and flying a cross-country trip led to disaster. This story is an excellent example of how one poor judgment often leads to another, and how the alternatives for safe flight are reduced when this happens.

### Pilot's Report:

(1) I was going to fly north to the logging camp with two supervisors for the next week-long shift and then return to home base with another "super" going off duty. (2) During my preflight weather briefing, I was told that the visibility in the home base local area was forecast to be marginal VFR, maybe even IFR, upon my return. (3) Enroute to the camp I updated my weather briefing and learned that the weather was probably not going to improve and that icing conditions prevailed. (4) I was getting a little concerned since I did not have an instrument rating.

(5) At the camp, I debated about refueling from the truck for the return trip. (6) I figured I had enough fuel to get back to base with about a 20-minute reserve. (7) I expected to get back about sunset, and decided that I would not really need any extra fuel reserve for night VFR flying. (8) So I decided against topping off the tanks. (9) I had made this trip probably 50 times, and I was sure I could do it--bad weather or not. (10) Besides, I was in a hurry to get going before the weather got even worse and the guy that drives the fuel truck was eating just then.

(11) So, I left the logging area with my passenger. (12) He asked me if I thought the weather was going to be a problem. (13) I remember telling him, "No, there's nothing to flying in this stuff." (14) At the time I really meant it.

(15) About 20 miles north of home, the weather had become really nasty with steady snow flurries and strong head winds. (16) I called home base operations on the company radio net and they told me the weather was "pretty bad" and the non-directional radio beacon we used for "homing" had failed. (17) I checked my fuel and realized with a start that there was about 20 minutes worth left in the tanks. (18) There wasn't much but dense forest between us and home base, certainly no airports to divert to, so we had no choice but to continue and land as soon as possible.

(19) With the NDB inoperative, I knew I would have to do some precise navigating. (20) Not wanting to alarm my passenger, I simply told him, "We'll be landing as quickly as possible. (21) Let's have no more conversation until we get on the ground." (22) His reply of "okay" came with a flat voice and a concerned look on his face.

(23) I did not see the company complex or the helipad as soon as I had hoped so I decided to dip a bit below the recommended minimum

altitude. (24) My aeronautical chart informed me that I was already at the lowest safe altitude in this sector but I couldn't see the ground very clearly.

(25) I thought, "Don't worry, the guy who assigns these altitudes always makes them a little higher than necessary," (26) I descended another 50 feet in hope of spotting some familiar landmark. (27) Soon after that, the helicopter struck some powerlines on the ridge a few hundred yards from the home base fence.

Questions:

1. What risk element combinations concern the pilot in sentence 4?
  - a. Pilot/Aircraft
  - b. Pilot/Environment
  - c. Aircraft/Environment
  - d. Pilot/Aircraft/Environment
2. Which hazardous attitude would you associate with the pilot's comment in sentence 9?
  - a. Anti-Authority
  - b. Impulsivity
  - c. Invulnerability
  - d. Macho
3. Which hazardous attitude would you suspect the pilot of using by what is said in sentence 13?
  - a. Anti-Authority
  - b. Impulsivity
  - c. Macho
  - d. Resignation
4. What is the risk element being considered in sentence 18?
  - a. Pilot
  - b. Aircraft
  - c. Environment
  - d. Aircraft/Environment

5. Which antidote is proper for the hazardous attitude that may be present in sentence 20?
  - a. "Follow the rules. They are usually right."
  - b. "I'm not helpless. I can make a difference."
  - c. "Not so fast. Think first."
  - d. "Taking chances is foolish."
6. Which hazardous attitude is shown by what the pilot says in sentence 25?
  - a. Anti-Authority
  - b. Impulsivity
  - c. Macho
  - d. Resignation
7. One principle of the decision sequence states, "One poor judgment increases the probability that another will follow." Which sentence in the scenario best illustrates this principle?
  - a. Number 4
  - b. Number 7
  - c. Number 13
  - d. Number 23

## E. PHYSIOLOGICAL FACTORS AND NIGHT FLYING DECISION MAKING

### Introduction

Night VFR poses additional difficulties to flying. The pilot who flies with a physiological impairment such as illness, fatigue, or intoxication faces obvious dangers. Yet, many accidents occur because pilots make poor judgments with regard to their ability to fly safely in spite of night conditions or physiological limitations.

Here are some common examples:

- Flying while under the influence of alcohol
- Flying after taking certain medications
- Flying with a known illness
- Flying when extremely fatigued

- Flying when emotionally upset
- Flying when hungry
- Flying into conditions which are likely to cause vertigo
- Flying VFR at night without sufficient experience at recognizing landmarks
- Understanding the factors which can cause disorientation at night

#### Situation Analysis Exercise

##### Directions:

The following report is the story of a pilot who nearly got into trouble because his poor decisionmaking led to physical impairment. When you finish, answer the questions following the scenario.

##### Pilot's Report:

(1) I had been flying a SAR mission for over an hour trying to rescue a mountain climber trapped on a ledge at the 13,500 foot level. (2) I guess I was pushing my luck since I had no oxygen. (3) I did not think anything would happen to me because I had done this sort of thing before and had always come out okay. (4) After we picked up the climber, we decided that he needed immediate treatment so I set a course that allowed me to descend to below 12,000 feet for the 25-30 minute flight to the hospital.

(5) When I set myself up on final to the elevated hospital helipad, I was a little "foggy" about how to land the helicopter. (6) I guess "confused" is a better word. (7) Well, because of my slow and fuzzy thinking, the helicopter got ahead of me. (8) I tried to land anyway, wanting to get on the ground and out of the helicopter as soon as possible.

(9) The next thing I knew, I had overshot the helipad, being too high and too fast on final, and actually dipped below the level of the rooftop on the upwind side. (10) Fortunately I had sufficient clearance on the other side but, nevertheless, I still had the stuffing scared out of me. (11) But, surprisingly enough, it also made me more alert. (12) I recovered, pulled pitch and got the helicopter climbing out of danger and turning to set up a second approach. (13) My second landing attempt was a little better but again rough because I was still feeling fuzzy in the head. (14) I guess I was lucky I made it around the second time.

(15) Right away I went to see my doctor. (16) He asked me what I had eaten before the flight. (17) When I told him my last meal was almost twelve hours before the trip and had consisted of a candy bar, he was obviously annoyed. (18) He said, "Your story sounds like a case of hypoxia (oxygen starvation) or of hypoglycemia (low blood sugar)--or both. (19) I suspect both because you continued to feel confused at the

lower altitudes. (20) Also, your symptoms cleared rapidly after your reaction to your first landing attempt. (21) A surge of adrenaline in such a situation will produce very rapid increase in blood sugar level. (22) However, the hypoxia may have made the blood sugar problem more severe."

(23) I left his office a grateful and wiser pilot. (24) I assured him that before flying I would eat a proper meal to maintain an adequate blood sugar level. (25) I also promised myself to get a supplemental oxygen system before trying another long flight at high altitude.

Questions:

1. The hazardous attitude best describing the pilot's thinking in sentence 3 is?
  - a. Anti-Authority
  - b. Impulsivity
  - c. Invulnerability
  - d. Resignation
2. The risk element mentioned in sentence 5 is?
  - a. Pilot
  - b. Aircraft
  - c. Environment
  - d. Aircraft/Environment
3. Which sentence suggests the hazardous attitude of impulsivity?
  - a. Number 7
  - b. Number 8
  - c. Number 9
  - d. Number 10
4. Which antidote would you suggest for what the pilot is saying in sentence 14?
  - a. "It could happen to me."
  - b. "Not so fast. Think first."
  - c. "Taking chances is foolish."
  - d. "I'm not helpless. I can make a difference."

5. What combination of risk elements does sentence 18 suggest?

- a. Pilot/Aircraft
- b. Pilot/Environment
- c. Aircraft/Environment
- d. Pilot/Aircraft/Environment

6. What does sentence 19 suggest to you about the doctor?

- a. He knows his patient very well.
- b. He does not know anything about helicopters.
- c. He knows something about psychiatry and psychology.
- d. He understands flight physiology and its effect on pilot judgment.

7. For which risk element has the pilot gained a greater respect, as indicated by sentence 24?

- a. Pilot
- b. Aircraft
- c. Environmental
- d. Pilot/Aircraft

8. The first principle of the decision making process states, "One poor judgment increases the probability that another poor judgment will follow." Which sentence best represents what this principle is about?

- a. Number 1
- b. Number 2
- c. Number 3
- d. Number 5

## 10.0 We Have Identified "The Enemy"

Most helicopter accidents are preventable. Most have one common factor: human error, rather than a mechanical malfunction. Helicopter pilots who are involved in accidents generally know what went wrong. Very often, the pilot was aware of the possible hazards when he chose the "wrong" course of action. In the interest of expediency, cost saving, self-gratification, or other, often irrelevant factors, the incorrect course of action was chosen.

The cycle of decisions begins at the flight planning desk. How much fuel? Which route? What alternate? Is the weather adequate?

It continues throughout the flight. What speed? What altitude? When to descend?

Each flight is a sequence of choices with certain milestones in the sequence that require particular determination and discretion.

Flying is rapidly changing from a physical to a mental task. Initial instruction to manipulate and control an aircraft requires approximately one to two years, but training to command an aircraft intelligently involves a decade or two of experience and periodic recurrent training. The ADM training you have just completed is designed to reduce the extremely long and sometimes painful process of learning how to make good judgment decisions based upon experience alone. It's true that simple errors of equipment operation are seldom serious, but mistakes in judgment may be fatal.

One essential decision point prior to flight is the checklist of basic principles that cannot be compromised. That personal checklist should include those fundamental, inviolable tenets that apply to every flight, without compromise. Once you have decided what you will not do, you will be better able to proceed with what you ought to do. Consider the following "nevers" that contribute significantly to unsafe flight:

- Flight while under the influence of alcohol or drugs, including applicable prescription drugs, is a "never". Several drinks of an alcoholic beverage will influence thought and reaction for approximately 24 hours, and heavy drinking will have lingering effects for up to 36 hours or longer; marijuana remains in the system for at least a week. The side effects and duration of all prescription drugs are well documented and available from a pharmacist. It should be obvious that flight safety is measurably compromised within those time periods.
- Flight with a known medical deficiency is never "expedient" or legal. (See FAR Part 61.53)
- Flight outside the certified flight envelope is never safe. Weight, balance, speed, maneuvers, G-loading, and flight in known icing should be limited to flight manual parameters. Beyond that, you are in the wilderness and all discoveries could be unhappy experiences.

- Flight with less than FAR minimum fuel is never reasonable. The applicable FAR's are sufficiently liberal. Twenty minutes fuel in VFR conditions, and "legal" IFR reserves are barely adequate to provide for contingencies. In this case the law is loose.
- VFR flight into IMC conditions is never justified.
- Descent below the applicable minimum enroute altitude anywhere is never justified.
- Casual neglect of any applicable checklist is never justified. Your list may be larger or smaller but certain standards ought to be established for all flights so that the first decision point is whether to begin the flight. This can be the toughest decision.

You don't have to be a genius to be a safe helicopter pilot. You only have to be an emotionally stable person who can accept the fact that you are not in possession of all facts or skills for all situations, and be willing to accept the recommendations of those who specialize in evaluating, assessing and administering aviation procedures.

Within the helicopter community, we have a difficult time reaching a consensus on all matters. One can always argue for different ways of doing things. Rules and procedures are designed to serve most of the people most of the time. A mature person will accept this and follow the rules for the benefit of all. The immature, emotionally immoderate person has strong tendencies to satisfy personal needs regardless of the consequences.

It is for the immediate gratification of some emotional need that we break the rules. It is common knowledge that a lot of things we often indulge in are not good for us (like smoking, speeding, overeating, etc.). We know this with our intellect, but our lives are too often guided by our emotions.

Existing rules would go a long way to remedy the accident rate, but the personality traits that cause irrational behavior, also make helicopter pilots prone to disregard the rules that would assure safe operations.

When you behave as a bad accident risk, you are showing your emotional weaknesses to everyone around you.

It is more difficult to develop good decision making skills than good flying skills, but it can be done. Good judgment may mean not flying when you are under medication, or when it is too windy, or refusing a revenue flight rather than flying in marginal weather.

Many helicopter pilots fail to make proper decisions. This is partly due to a lack of knowledge, but too often the result of human tendency to rationalize things until they look justifiable to the pilot. When we really want to do something, (such as loading that one last passenger when close to "max gross", or taking off over the other helicopter in the

LZ when you're ready to go and he's not, or performing a high-speed, low level pass) we can generally make ourselves believe it is all right to do it.

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#### **"The Enemy Is Us"**

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There are "do's and don'ts" available to pilots that can ensure the prevention of most accidents. In addition, there are FARs, Advisory Circulars, articles in magazines, books written by expert pilots and instructors, Pilot Proficiency Programs, Airman's Information Manual, Airworthiness Directives, Biennial Flight Reviews, and many other sources of safe operating procedures. All of this information serves only safety. Not to follow them is like going against your own doctor's or lawyer's advice.

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#### **"The Choice Is Yours"**

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The most important decision for you to make is to learn and stick with published rules, procedures and recommendations. They are well proven reasons and can take most hazards out of your flying. If you don't believe that, then you are kidding yourself.

As a pilot, you hold human lives in your hands. You have a moral responsibility to operate in the safest way. If you are a bad accident risk, society would be better off if you didn't fly at all.

We have reached a new plateau in aviation. Acquiring aeronautical knowledge, airmanship skills and proficiency are relatively easy. Navigation has been reduced to calculator simplicity. Modern helicopter stabilization systems, autopilots and electronic displays significantly reduce workload. The utilization of today's helicopter technology requires administrative management and aeronautical decision making skills as the prerequisites for safety and efficiency.

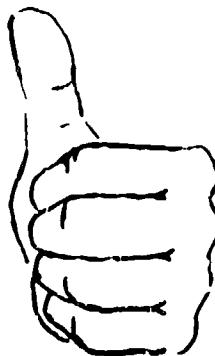
## 11.0 Summary

You have now completed the first step toward improved flight safety -- better decision making. This manual was prepared to make you more aware of the basic risks and underlying hazards of helicopter flying. The second important step will be the application of the concepts you have learned to your everyday flying.

To summarize, you should now know that your attitudes are personal motivational characteristics. You can learn to recognize and control them as necessary in order to improve your decisionmaking skills. Recall that good judgment has two components. The first is your ability to assess the risk elements objectively in each flight situation. The second is your positive motivation to choose and execute a course of action which maximizes safety.

By employing these two aspects of good judgment, you should now be able to counteract the natural goal oriented tendencies which have historically caused "pilot error" accidents. Hopefully, you will never stretch that last mile out of your fuel supply, fly in weather for which you or your aircraft are not prepared, or at dangerously low altitudes in spite of known obstructions. As stated in a previous Navy report on wire strikes "If you don't want to be eaten by sharks, stay out of the water." It applies equally well to inadvertent collision with terrain. Flight rules about MOCAs, MEAs, MDAs and DHs have been made to protect you, but you still make the final decision.

In assessing each flight (or preflight) situation, remember the five basic risk elements, develop the habit of carefully assessing each one and as stated earlier "deal yourself a good hand."

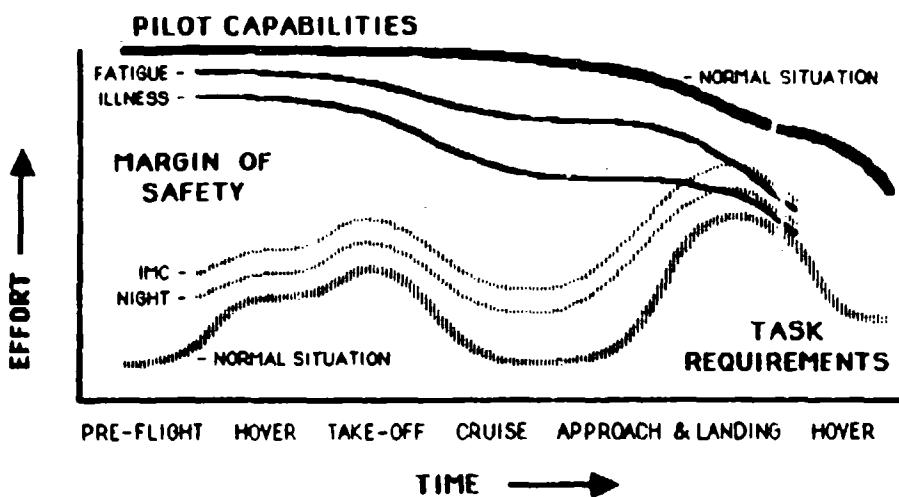


Remember, success in decision making is measured by your consistent ability to keep yourself, your passengers and your aircraft in good condition, regardless of the situations of any given flight.

Have you determined what hazardous attitudes you might have? If your tendency is anti-authority, impulsivity, invulnerability, macho or resignation - be aware of it. Write a reminder on your checklist or kneeboard if necessary, but above all, learn to control it. Secondly,

be sure to reevaluate your attitude profile periodically. It is possible that it may change along with your personal and professional growth. As you improve your flying skills, increase your knowledge and gain experience, you should also be aware of the subtle attitudinal changes that can be associated with creeping complacency and overconfidence. Include decision making reinforcement as part of your post flight risk assessment. Use it as part of your risk management techniques to improve the overall safety situation the next time you fly and in all your future flying.

Finally, remember the influence of stress on your flying and decision making skills. Before and during each flight be aware of what stresses you may have experienced and be sure to include them in the analysis of your own capabilities and the situation. Constantly monitor your "margin of safety."



Treating the stress increasers, especially night flying and deteriorating weather, with respect based on knowledge will enhance your reputation as a true professional.

Congratulations on your persistent review of these materials. Knowledge, skills, experiences -- capped with good decision making, is the basis for safe flying.

Good luck and good flying.



**APPENDIX A**

## APPENDIX A -- Answer Key

### Answer to Blimp Center of Buoyancy Problem -- Chapter 2.0

<u>Page</u>	<u>Drill</u>	<u>Answer</u>
16	2	The CB must lie on the longitudinal axis of the blimp to insure longitudinal stability. To insure static stability the correct answer is the center box.

### Answer Key to Chapter 5.0 Exercises

<u>Page</u>	<u>Exercise</u>	<u>Answer</u>
47	Sample	b
48	A1	a
49	A2	e
50	A3	c
51	B1	d
52	B2	b
53	B3	e
55	C1	a
56	C2	c
57	C3	b
58	D1	b
59	D2	d
60	D3	b
61	E1	d
62	E2	a
63	E3	d

### Answer Key to Chapter 6.0 Exercises

<u>Page</u>	<u>Situation</u>	<u>Hazardous Attitude</u>	<u>Antidote</u>	<u>Good Judgment</u>
74	1	Macho	Taking Chances is foolish.	If I land at my alternate and refuel I can improve the safety of flight.
74	2	Resignation	I can make a difference.	If I delay departure I can determine the seriousness of the problem.
75	3	Invulnerability	It could happen to me.	We'd better cancel this flight; it is too risky.

75	4	Impulsivity	Not so fast, think first.	Call ATC and request vectors to nearest hospital and permission to make an emergency landing.
76	5	Invulnerability	It could happen to me.	Flying and alcohol never mix. Set your own standards but never less than the FARs.
77	6	Invulnerability	It could happen to me.	Most fatal accidents occur in inadvertant IMC. I'd better cancel.
77	7	Macho	Taking Chances is foolish.	300' and three miles at night are unsafe minimums. We can not fly.
78	8	Anti Authority	Follow the rules.	I'm too close. I'd better turn right and execute a go around.
78	9	Impulsivity	Not so Fast. Think first.	A controlled 90 degree turn away from the direction of the birds flight will be safer.
79	10	Resignation	I'm not helpless. I can make the difference.	What other alternates are within fuel range? Should I declare an emergency?

#### Answer Key to Chapter 9.0 Exercises

##### A. Preflight Decision Making

<u>Page</u>	<u>Number</u>	<u>Answer</u>
103	1	c
104	2	b
104	3	b
104	4	b
104	5	d
104	6	c
105	7	c
105	8	d

B. Weight/Balance Performance

<u>Page</u>	<u>Number</u>	<u>Answer</u>
107	1	b
107	2	b
107	3	d
107	4	d
108	5	a
108	6	c
108	7	e
108	8	b
108	9	a

C. Procedures and Communications

<u>Page</u>	<u>Number</u>	<u>Answer</u>
110	1	c
111	2	d
111	3	a
111	4	c
111	5	b
111	6	a
112	7	a
112	8	d

D. Cross Country Flying Decision

<u>Page</u>	<u>Number</u>	<u>Answer</u>
114	1	b
114	2	d
114	3	c
114	4	c
115	5	c
115	6	a
115	7	b

E. Physiological Factors and Night Flying Decision Making.

<u>Page</u>	<u>Number</u>	<u>Answer</u>
117	1	c
117	2	a
117	3	b
117	4	c
118	5	b
118	6	d
118	7	a
118	8	c

**APPENDIX B**

APPENDIX B -- List of Acronyms

VIP	- Very Important Person
CEO	- Chief Executive Officer (a VIP)
IFR	- Instrument Flight Rules
VFR	- Visual Flight Rules
ADM	- Aeronautical Decision Making
FBO	- Fixed Base Operator
ATIS	- Automatic Terminal Information Service
FAR	- Federal Aviation Regulation
MOCA	- Minimum Obstruction Clearance Altitude
MEA	- Minimum Enroute Altitude (IFR)
MDA	- Minimum Descent Altitude
DH	- Decision Height
SAR	- Search And Rescue

## THE FIVE ANTIDOTES

Hazardous Attitude	Antidote
<b>ANTI-AUTHORITY:</b> "Don't tell me"	"Follow the rules. They are usually right."
<b>IMPULSIVITY:</b> "Do something - quickly!"	"Not so fast. Think first."
<b>INVULNERABILITY:</b> "It won't happen to me."	"It could happen to me."
<b>MACHO:</b> "I can do it."	"Taking chances is foolish."
<b>RESIGNATION:</b> "What's the use?"	"I'm not helpless. I can make a difference."

## AERONAUTICAL DECISION MAKING PROCESS

